Main Building. Chemical Laboratory. Biological Laboratory.

OHIO AGRICULTURAL EXPERIMENT STATION.

Twentieth Annual Report

OF THE

Ohio Agricultural Experiment Station

For the Year Ending June 30, 1901.

Published by Order of the State Legislature.

NORWALK, O.
THE LANING COMPANY
1902

This page intentionally blank.

ANNOUNCEMENT.

The Ohio Agricultural Experiment Station is organized under an act of the General Assembly of Ohio, passed April 17, 1882, and supplemented by an act of Congress approved March 2, 1887.

The Station is prepared to test new varieties of grains, fruits and garden vegetables; to examine seeds that are suspected of being unsound or adulterated; to identify and name grasses, weeds and other plants; to identify insects and suggest measures for the control of such as are injurious; to give advice concerning the prevention of the fungous diseases which affect vegetation, and to assist in the diagnosis and control of tuberculosis and other diseases of cattle.

The Station is not prepared to furnish analyses of chemical or commercial fertilizers, as in Ohio that work is performed under direction of the Secretary of the State Board of Agriculture, at Columbus; but the Station will at all times respond to requests for advice concerning the use of such fertilizers.

The Station is not prepared to examine foods and dairy products suspected of adulteration, as that work is in charge of the Ohio Dairy and Food Commissioner, whose office is at Columbus.

Any citizen of Ohio has the right to apply to the Station for any information it can give, and all such applications will receive prompt attention.

Visitors to the Station are always welcome.

Address all communications to

EXPERIMENT STATION,
Wooster, Ohio.

ORGANIZATION OF THE

OHIO AGRICULTURAL EXPERIMENT STATION.

BOARD OF CONTROL.

R. H. WARDER.....North Bend
J. T. ROBINSON.....Rockaway
HON. L. M. STRONG.....Kenton
THE GOVERNOR OF THE STATE, THE DIRECTOR OF THE STATION.....*Ex officio*

OFFICERS OF THE BOARD.

J. T. ROBINSON.....President
R. H. WARDER.....Secretary
PERCY A. HINMAN.....Treasurer

STATION STAFF.

CHARLES E. THORNE	Wooster	Director
WILLIAM J. GREEN	"	Horticulturist and Vice-Director
J. FREMONT HICKMAN, M. A. S.	"	Agriculturist
FRANCIS M. WEBSTER, M. S.	"	Entomologist
AUGUSTINE D. SELBY, B. Sc.	"	Botanist and Chemist
PERCY A. HINMAN	"	Bursar
JOHN W. AMES, B. Sc.	"	Assistant Chemist
JOHN F. HICKS	"	Assistant Botanist
WILMON NEWELL, M. Sc.	"	Assistant Entomologist
J. C. BURNESON, V. S.	"	Veterinarian
CLARENCE W. WAID, B. Sc.	"	Assistant Horticulturist
WILLIAM HOLMES	"	Foreman of Farm
CHARLES A. PATTON	"	Ass't Foreman and Meteorologist
ANNIE B. AYRES	"	Mailing Clerk
CARY WELTY	"	Mechanic
EDWARD MOHN	Strongsville	Supt. Northeastern Sub-Station
LEWIS SCHULTZ	Swanton, R. D.	Supt. Northwestern Sub-Station

The Bulletins of this Station are issued at irregular intervals. They are paged consecutively, and an index is included with the Annual Report, which constitutes the final number of each yearly volume.

To His Excellency, GEORGE K. NASH, *Governor of Ohio:*

SIR: I have the honor to transmit herewith the twentieth annual report of the Ohio Agricultural Experiment Station, for the fiscal year ending June 30, 1901.

R. H. WARDER, Secretary.

REPORT OF THE TREASURER.

To HON. J. T. ROBINSON, *President of the Board of Control:*

SIR: I respectfully submit herewith the financial report of this Station for the fiscal year ending June 30, 1901:

In Statements A, B, C and D, respectively, will be found a record of the receipts and expenditures from the various funds; Statement A being a statement of account with the annual appropriation received from the U. S. Treasury, and a copy of the report made to the Governor of the State, the Secretary of Agriculture and the Secretary of the U. S. Treasury; Statement B being a statement of account with the State Treasury; and Statement C showing the receipts from farm produce and other sources and expenditures from this fund.

The three statements, A, B and C, are combined in Statement D, which shows the total income and expenditures for the fiscal year.

STATEMENT A.

THE OHIO AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH THE UNITED STATES APPROPRIATION, 1900-1901.

Dr.

To receipts from the Treasurer of the United States, as per appropriation for the fiscal year ending June 30, 1901, as per act of Congress approved March 2, 1887	$15,000 00

Cr.

By expenditures for—		
Salaries	$12,362 32	
Labor	1,126 93	
Publications	60 84	
Postage and stationery	132 37	
Heat, light, water and power	71 50	
Seeds, plants and sundry supplies	455 22	
Fertilizers	96 52	
Feeding stuffs	283 34	
Library	165 25	
Tools, implements and machinery	119 12	
Scientific apparatus	33 75	
Contingent expenses	10 00	
Building and repairs	82 84	
		$15,000 00

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Ohio Agricultural Experiment Station for the fiscal year ending June 30, 1901, that I have found the same well kept and classified as above and that the receipts for the year from the Treasurer of the United States are shown to have been $15,000, and the corresponding disbursements $15,000; for all of which proper vouchers are on file and have been by me examined and found correct.

And I further certify that the expenditures have been solely for the purposes set forth in the Act of Congress approved March 2, 1887.

{ SEAL OF INSTITUTION. }

Signed,

J. T. ROBINSON,

Auditor of Board of Control.

Attest: CHAS. E. THORNE, *Custodian.*

I hereby certify that the foregoing statement of account to which this is attached, is a true copy from the books of account of the institution named

P. A. HINMAN,

Treasurer of Board of Control.

STATEMENT B.

OHIO AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH THE STATE TREASURY.

Date of appropriation.	Appropriation for—	Total amount to the Station's credit.	Total amount expended.	Balance in treasury June 30, 1901.
1901	Expenses of Board of Control	$700 00		$700 00
	Sub-stations for field experiments	2,000 00	$322 06	1,677 94
	Bulletin illustration	400 00		400 00
	Special work in entomology, botany, horticulture and chemistry	4,000 00	762 23	3,237 77
	General repairs, labor and suppplies	3,500 00	2,989 29	510 71
	Investigation of tuberculosis, and other diseases of cattle	3,000 00		3,000 00
	Totals for 1901	$13,600 00	$4,073 58	$9,526 42
	Balance of appropriations for 1900 brought forward July 1, 1900			
1900	Expenses of Board of Control	$282 16	$241 43	$40 73
	Sub-stations for field experiments	1,758 15	1,758 15	
	Bulletin illustration	276 73	275 77	96
	Special work in entomology, botany horticulture and chemistry	2,868 79	2,868 79	
	General repairs, labor and supplies	550 83	550 83	
	Investigation of tuberculosis, and other diseases of cattle	3,000 00	1,364 01	1,635 99
	New construction	4,850 00	4,000 00	850 00
	Totals	$27,186 66	$15,132 56	$12,054 10

STATEMENT C.

OHIO AGRICULTURAL EXPERIMENT STATION IN ACCOUNT WITH PRODUCE FUND.

To Receipts.

June 30, 1901.		
From sales of agricultural produce	$1,359 46	
" dairy produce	735 58	
" live stock	1,775 79	
" horticultural produce	1,289 50	
" botanical produce	15 18	
Northeastern Sub-station produce	43 10	
Northwestern Sub-station produce	84 46	
Total produce		$5,303 07
labor		107 50
rents		716 50
miscellaneous sales		653 08
fees for testing dairy cattle (milk test)		197 64
fees for chemical analysis		66 00
Total receipts for the year		$7,043 79
To balance brought forward July 1, 1900		1,384 72
Total		$8,428 51

By Expenditures.

June 30, 1901.		
For salaries, special and temporary services	12 75	
labor	4,723 44	
postage and stationery	29 02	
freight and express	384 10	
heat, light, water and power	80 46	
chemical supplies	5 27	
seeds, plants and sundry supplies	376 36	
feeding stuffs	93 02	
library	16 55	
tools, implements and machinery	42 55	
furniture and fixtures	69 88	
live stock	22 80	
traveling expenses	36 75	
contingent expenses	76 00	
building, repairs and farm improvement	661 74	
miscellaneous	441 05	
Total expenditures for the year		$7,071 74
By balance carried forward		1,356 77
Total		$8,428 51

STATEMENT D.

TOTAL RECEIPTS AND EXPENDITURES OF THE OHIO AGRICULTURAL EXPERIMENT STATION FOR THE YEAR ENDING JUNE 30, 1901.

Total Receipts.

From U. S. Treasury	$15,000 00	
State appropriations	13,600 00	
miscellaneous receipts	7,043 79	
Total receipts for the year		$35,643 79
To balance brought forward July 1, 1900		14,971 38
Total		$50,615 17

Total Expenditures.

For salaries and wages: technical and office staff	$12,731 97	
special and temporary services	12 75	
foremen and skilled laborers	$3,778 32	
ordinary laborers	6,549 11	
Total labor	10,327 43	
publications	469 39	
postage and stationery	328 24	
freight and express	488 30	
heat, light, water and power	676 84	
chemical supplies	45 59	
seeds, plants and sundry supplies	1,472 81	
fertilizers	266 87	
feeding stuffs	1,097 33	
library	467 90	
tools, implements and machinery	267 38	
furniture and fixtures	159 62	
scientific apparatus	167 47	
live stock	679 85	
traveling expenses	1,017 11	
contingent expenses	342 45	
buildings, repairs and farm improvement	5,743 95	
miscellaneous	441 05	
Total expenditures for the year		$37,204 30
By balance carried forward		13,410 87
Total		$50,615 17

Respectfully submitted.

P. A. HINMAN, *Treasurer.*

REPORT OF THE DIRECTOR.

HON. J. T. ROBINSON, *President of the Board of Control:*

SIR: I have the honor to submit herewith the twentieth annual report of the Ohio Agricultural Experiment Station, for the year ending June 30, 1901.

In the study of the problems relating to maintenance of fertility the work of the year has further confirmed the adaptability of the soil upon which the Station is now located to this fundamental work. At the same time evidence is constantly increasing that a larger number of soils must be placed under experiment if the Station is to accomplish its full mission to the farmers of the state. The fact that certain sections of the state regularly produce four to eight bushels of wheat per acre more than other sections is one demanding careful investigation.

Experiments in cattle feeding were repeated during the past winter and their results, together with those of previous work of the same character, are being compiled for publication. The immense amount of careful computation required to put this work into available form, and the lack of suitable clerical help, has caused the accumulation of a large amount of unpublished data, which we now hope soon to have in print.

The Station's variety tests of cereals, fruits, etc., have been continued on the plans adopted nine years ago, and each year's work more fully demonstrates the possibility of making this work, when conducted on scientific principles, of enormous practical value. Taking wheat again as an illustration, an increase of a bushel per acre means the addition of at least $2,000,000 annually to Ohio's wealth; but certain varieties in the Station's tests have given a 9-year average of several bushels per acre more than others in general cultivation. Here again, however, is shown the need of opportunity for conducting these tests over a wider range of soils and climate than is now possible.

No part of the Station's work has yielded results of greater immediate value than its study of the fungous diseases of plants. Its work on apple scab has enabled practical orchardists to bring back, in isolated instances, the certainty in apple production which prevailed in Ohio forty years ago. What these have done others may do. Similar work is being done for the grape grower, and there is abundant reason to expect that the principal fungous pests of the farm, orchard and garden may soon be brought under control.

The chemical department of the Station has been of direct service to the farmers of the state in showing the probabilities of success in the production of beet sugar in different sections of the state. This work has been carried on in co-operation with the United States Department of Agriculture on the one hand, and with farmers of the state on the other, and it now serves as a reliable guide in the exploitation of this industry.

The investigation of tuberculosis of cattle, ordered by the last General Assembly, has been limited to the testing with tuberculin of such cattle as have been offered for such test, the tuberculin for this purpose being furnished by the Bureau of Animal Industry, U. S. Department of Agriculture. This work has shown that the disease exists in many herds of cattle throughout the state; but that it has not yet become so prevalent but that it may be kept under control. Some of the infirmaries and children's homes of the state have submitted their herds to the test, and in a few instances the disease has been found to be present. It would seem to be a duty of the state to require all herds belonging to its benevolent institutions to be subjected annually to this test. The appearance of the disease in some of the large dairy herds supplying our cities with milk certainly justifies municipal inspection of the milk supply.

Enough is now known regarding this disease to prove that its establishment within a herd of cattle means inevitable financial loss. The disease may be so insidious in its onset as to be unsuspected for a long time, and years may elapse before any alarming symptoms are manifested, but eventually the deaths will become more and more frequent, while the less conspicuous losses from feeding animals of impaired vitality will often be greater than those from actual death. Aside from the possibility of communicating this dread disease to human victims, especially to infants, through the use of the milk of tuberculous cattle—and the last word is far from having been said on this point—the certainty that financial loss follows in its train should be sufficient inducement to every cattle owner to see that his herds are free from it. The state, in making the tuberculin test free of charge, is offering him the opportunity to accomplish this end with the smallest possible loss.

The infection of tuberculosis is probably not communicated by mere proximity, but is spread among cattle chiefly or altogether through the discharges from the mouth and nose or through the milk. Its existence on a farm is not, therefore, so serious a menace to the farms adjoining as would be that of pleuro-pneumonia, Texas fever, or similarly contagious diseases, and such legislation as may be undertaken concerning it should have for its object the restriction of the traffic in the meat or dairy products of diseased cattle, rather than an attempt at immediate stamping out of the disease.

The following publications have been issued by the Station during the year:

Bulletin 121, pp. 1–70: A condensed handbook of the diseases of cultivated plants in Ohio. By A. D. Selby.

Bulletin 122, pp. 71–84: Onion Smut—preliminary experiments. By A. D. Selby.

Bulletin 123, pp. 85–102: I. Grape rots in Ohio. II. Experiments in the prevention of grape rot. By A. D. Selby.

Bulletin 124, pp. 103–120: The maintenance of fertility: Field experiments with fertilizers on corn, oats, and wheat, 1899 and 1900. By C. E. Thorne.

Bulletin 125, pp. 121–132: The maintenance of fertility: Field experiments with fertilizers on potatoes, 1894 to 1900. By C. E. Thorne.

Bulletin 126, pp. 133–174: Sugar beet investigations in Ohio in 1900. By A. D. Selby and J. W. Ames.

Bulletin 127, pp. 175–218: Miscellaneous chemical analyses. By A. D. Selby, J. W. Ames and others.

Bulletin 128, pp. 219–231: Meteorological summary, by C. A. Patten; Press bulletins 112–124 and index. This bulletin is appended to the present report.

ACKNOWLEDGMENTS.

The following publications have been received during the year as donations to the Station's library, or in exchange for its bulletins:

BOOKS, PAMPHLETS AND SCIENTIFIC PERIODICALS.

Agricultural Experiment Stations: The bulletins of all the experiment stations of the United States are regularly received.

AFRICA: Cape of Good Hope Department of Agriculture: Bulletins on orchard work, dairy industry and liver disease among calves. Capetown.

AUSTRALIA: A report upon some factors relating to the cane sugar industry of Australia, by Dr. Walter Maxwell, to the Right Hon. Edmund Barton, Esq., Premier Commonwealth of Australia.

New South Wales Botanic Gardens and Domains, Sydney: J. H. Maiden, Director. Annual reports for 1899 and 1900, and miscellaneous publications.

BARBADOES: Barbadoes Botanic Station, John R. Bovel, Superintendent: West Indian Hurricanes.

CANADA: Dominion Experimental Farms, Prof. Wm Saunders, Director, Ottawa: Annual report and bulletins for 1900.

Department of Agriculture, North-West Territories, G. H. Bulyea, Commissioner, Regina: Annual report for 1900.

Experimental Farm for North-West Territories, Angus Mackay, Superintendent, Indian Head: Annual report for 1900.

Ontario Department of Agriculture, Hon. John Dryden, Minister, Toronto: Annual report for 1900, 2 vols: Also, separate reports of the Agricultural College and Experimental Farm; Experimental Union; Live Stock Associations; Registrar of Live Stock; Farmers' Institutes; Bee Keepers' Association; Poultry Association; Fruit Growers' Association; Fruit Experiment Station and bulletins of the Agricultural College and Bureau of Industries.

ENGLAND: Annual report to the secretary of the Board of Agriculture on the distribution of grants for agricultural education and research, for the year 1899–1900, by P. G. Gragie.

Aynsome Agricultural Station and Farm: Grange-over-Sands, Lancashire, Prospectus of farm and laboratory.

Journal of the Royal Horticultural Society for 1901. Parts 1 and 2. London, 117 Victoria St., Westminster St. S W.

Durham College of Science, Newcastle-upon-Tyne: Report on experiments with crops and stock during the season of 1900, compiled by T. H. Middleton, MSc.

Garforth experiments (the) 1899: Published by the East and West Ridings Joint Agricultural Council and the Yorkshire College.

FRANCE: Agenda Agricole et Viticole: par V. Vermorel: Villefranche (Rhone).

Bibliographia Lactaria: Premier supplement (Annee 1900) a la bibliographie generale des travaux parus sur le lait et sur l'allaitement jusq' en, 1899, par Le Dr. Henri de Rothschild, Paris: Octave Doin, Editeur, 8 Place de l'Odeon.

Comite de viticulture, Le, de l'arrondissement de Cognac, par James Hennessy, Cognac, France.

Congres international de l'enseignement agricole, tenu à Paris, du 14 au 16 Juin, 1900. M. de Lagorsse, Secretaire general. Paris, Imprimerie Nationale.

Congres international des stations agronomiques, tenu à Paris, du 18 au 20 Juin, 1900. M. Louis Grandeau, Secretaire general, Paris, France. Paris, Imprimerie Nationale.

Ecole Nationale d'Agriculture de Montpellier. Les effets de la foudre et la gelivre, par M. M. L. Ravaz et A. Bonnet.

Trois Jours en Beaujolais: Excursions viticoles offert par la Station Viticole de Villefranche (Rhone). V. Vermorel.

GERMANY: Konigl. botanischen Gartens und Museums zu Berlin: Notizblatt, 1900.

Die Botanischen Institute die freien und Hansestadt Hamburg. Im Auftrage der Oberschubchörde. Von Dr. A. Voigt.

Botanisches Museum, Abtheilung für Pflanzenschutz, zu Hamburg. II, 1899–1900. Dr. C. Brick.

Jahres-Bericht der Agrikulturchemischen Versuchsstation in Kiel, für 1899 and 1900, von Geh-Reg-Rath Prof. Dr. A. Emmerling.

Bericht über die Thatigkeit der Agriculturchemischen Versuchs-und Samencontrolstation in Köslin, für das Jahr 1899. Dr. Baessler, Director.

Jahresbericht der Landwirthschaftl. Versuchsstation zu Marburg, über das Statsjahr 1900–01. Erstattet von deren Vorstcher Prof. Dr. Dietrich.

INDIA: Government of Mysore: Report of the Agricultural Chemist, for the year 1899–1900.

Northwestern Provinces and Oudh: Report on the progress and condition of the Government Botanical Gardens, Saharanpur and Arnigadh, for the year ending March 31, 1901.

HAWAII: Biennial report of the Minister of public instruction for 1898–99. Honolulu.

HOLLAND: Koninklijk Zoologisch-Botanisch Genootschap te's–Gravenhage Verslag van den toetstand over het jaar 1900.

JAMAICA: Bulletin of the Botanical Department, by William Fawcett, Director of Public Gardens and Plantations.

JAPAN: L'Institut Agronomique de Sapporo, Japan, 1900. (Abridged history and description, published for the Paris Exposition.)

JAVA: Verslag over 1900 van het Proefstation voor Suikerriet in West-Java "Kagok" te Pekalongan, S. C. van Musschenbroek, President. Also: Medeelingen, Nos. 43, 45, 46, 47, 50, 51 with colored plates.

MEXICO: Boletin de la Parasitologia Agricola, Tomo I. Redactado Por el Professor A. L. Herrera.

SCOTLAND: West of Scotland Agricultural College, Glasgow, R. Patrick Wright, Principal: First annual report on agricultural experiments, conducted in 1899.

SERVIA: "Javremorac," Jardin botanique du Royaume de Serbie a Belgrade, VIII Annee.

SOUTH AMERICA: Buenos Ayres: Annales del Museo Nacional de Buenos Aires, Segunda Serie, Tomos IV, V, VI. Also: Communicaciones del Museo Nacional de Buenos Aires, Tomo I: Prof. Dr. Carlos Berg, Actual Director.

SPAIN: Memorias de la Real Academia de Ciencias exactas, fiscas y naturales de Madrid, Tomo XIV, Estudios preliminares sobre de la fauna malacologica de las islas Filipinas. Joaquin Gonzales Hidalgo.

SWEDEN: Nyt Magazin for Naturvidenskaberne grundlagt af den physiographiske forening i Christiana. 1901.

UNITED STATES: American Museum of Natural History, Central Park, N. Y. City. Extracts from bulletin.

California State Board of Horticulture, B. M. Lelong, Secretary, 6th Annual report, for 1897–98.

California Viticultural Commission and California State Agricultural Society: Reports and Transactions, from Prof. Chas. H. Shinn, Berkeley.

Cheese Making: By Prof. John W. Decker, Ohio State University, Columbus, Ohio.

Clark County (Ohio) Horticultural Society, A. E. Humphreys, Secretary, Report for 1899.

Colorado College Studies: Volume IX, May 1891. Colorado Springs, Colo,

Columbus Horticultural Society, Homer C. Price and John F. Cunningham, Secretaries: Journal for 1898, 1899 and 1900.

Continental Dorset Club, J. E. Wing, Secretary, Mechanicsburg, Ohio: Record, Volume 1, 1900.

Elisha Mitchell Scientific Society, Chapel Hill, N. C.: Journal, Seventeenth year.

Florida Department of Agriculture, B. E. McLin, Commissioner, Tallahassee: Report, 1899–1900.

German Kali Works, New York City; Reports of experiments in the use of fertilizers.

Idaho State Engineer: Biennial report for 1899–1900. D. W. Ross, State Engineer.

Illinois Department of Agriculture, W. C. Garrard, Secretary, Springfield: Transactions for 1884 to 1899. 16 Vols.

Illinois Horticultural Society, L. R. Bryant, Secretary, Princeton: Transactions for 1899 and 1900.

Illinois Live Stock Commission; C. P. Johnson, Secretary, Chicago: Annual report for 1899.

Illinois State Food Commission, Alfred H. Jones, Secretary, Chicago: First annual report.

Indiana Academy of Science: Proceedings, 1899. Geo. W. Benton, Editor, Indianapolis.

Indiana Department of Geology and Natural Resources, W. S. Blatchley, State Geologist, Indianapolis: Annual Report for 1900.

Indiana Horticultural Society, James Troop, Secretary, Lafayette: Transactions for 1899.

Iowa Geological Survey, Samuel Calvin, State Geologist, Des Moines: Annual report for 1900.

Iowa State Horticultural Society, Wesley Greene, Secretary, Des Moines. Transactions for 1895 to 1899, inclusive, 5 volumes.

Iowa State University, Iowa City: Bulletins from the laboratories of natural history.

Kansas State Board of Agriculture, F. D. Coburn, Secretary, Topeka: 12th Annual report for 1900.

Los Angeles Public Library, Los Angeles, Cal.: Annual report for 1900.

Maine Board of Agriculture, B. Walker McKeen, Secretary, Augusta: Bulletin for 1900.

Maine Registration Report for 1898 and 1899, A. G. Young, M. D. Reg. Augusta.

Massachusetts Horticultural Society, James W. Stockwell, Secretary, Boston: Transactions for 1900.

Michigan State Horticultural Society, E. C. Reid, Secretary, Agricultural College: 28th and 29th Annual Reports for 1898 and 1899. 2 Vols.

Michigan Weather Service, C. F. Schneider, Director, Lansing: Annual report for 1897.

Minnesota State Horticultural Society, A. W. Latham, Secretary, Minneapolis: Trees, Fruits and Flowers of Minnesota, 1900.

Missouri State Horticultural Society, L. A. Goodman, Secretary, Kansas City: 39th, 41st, 42d and 43rd Annual Reports for 1896, 1898, 1899 and 1900. 4 Vols.

Montana State Board of Horticulture: First Biennial Report for 1899–1900.

New York Department of Agriculture, C. A. Wieting, Secretary, Albany: Sixth Annual Report for 1899. 3 Vols.

New York State Horticultural Society, W. C. Barry, President: Proceedings 44th and 45th Annual meetings, 1899 and 1900.

New York State Library, Melvil Dewey, Director, Albany: Annual Report, 1899.

New York State Museum, Albany: Annual Reports of Director, State Botanist, State Entomologist and State Geologist.

North Carolina Horticultural Society: Experiments with fertilizers at Southern Pines, N. C.

North Dakota Department of Agriculture and Labor, Henry U. Thomas, Commissioner, Fargo: Annual Report for 1900.

Ohio Archaeological and Historical Society, E. O. Randall, Secretary, Columbus: Quarterly Reports.

Ohio State Board of Agriculture, W. W. Miller, Secretary, Columbus: 54th Annual Report for 1899.

Ohio Statistics and other state publications, from Hon. L. C. Laylin, Secretary of State, Columbus.

Oregon Board of Horticulture, John Minto, Secretary, Salem: Annual Report for 1899–1900.

Peninsula Horticultural Society, Wesley Webb, Secretary, Dover, Del.: Transactions for 1901.

Ohio State Horticultural Society: Copies of annual reports to complete files, from B. H. Brown, Oxford; Chas. Lauppe, Urbana; G. Swably, Tiffin, and Samnel Taylor, Pleasant Corners.

Pennsylvania Department of Agriculture, Prof. John Hamilton, Secretary, Harrisburg: Reports for 1884 and 1886 to 1892, 1898 and 1900. 9 vols. Also bulletins to 1898.

Rhode Island State Board of Agriculture, Geo. A. Stockwell, Secretary, Providence: Annual Report for 1899.

St. Louis Academy of Science: Transactions for 1900.

Trumbull County, (Ohio) Horticultural Society, E. W. Turner, Secretary: Proceedings for 1881, 1882 and 1883.

University of the State of New York, Albany: Bulletins of the New York State Museum, Frederick J. Merrill, Director: Home Education Bulletin No. 31, on Public Libraries and Popular Education.

U. S. Bureau of Statistics, Treasury Department, O. R. Austin, Chief, Washington, D. C.: Monthly summary of finance and commerce and annual reports of commerce and navigation of the United States.

U. S. Department of State: Commercial relations, 1899: Consular reports: Special reports on Tariffs of Foreign Countries.

U. S. Geological Survey, Nineteenth Annual report, from Hon. Marcus Hanna, U. S. Senate.

West Virginia Board of Agriculture, J. B. Garvin, Secretary 5th Biennial report for 1899-1900.

Wisconsin Academy of Science, Arts and Letters, F. C. Sharp, Secretary: Transactions for 1899, 1900-1901.

Wisconsin Horticultural Society, F.W. Case, Secretary: Transactions for 1891-1892.

GOVERNMENT SERIAL PUBLICATIONS.

Agricultural Gazette of New South Wales: Issued monthly by direction of the Secretary for Mines and Agriculture, Sydney, New South Wales, Australia.

Agricultural Journal, Cape of Good Hope: Published monthly by the Department of Agriculture, Cape Town, South Africa.

Agricultural Journal and Mining Record: Issued fortnightly by the Natal Department of Agriculture and Mines, Maritzburg, Natal, South Africa.

Annuaire Agricole de la Suisse: Publie par le Departement federal de l' Agriculture (Berne, Switzerland).

Boletin de Agricultura, Mineria e Industrias: Publicado por la Secretaria di Fomento, Colonizacion e Industria de la Republica Mexicana: (Published monthly, City of Mexico.)

Boletin de la Sociedad Nacional de Agricultura: (Published monthly at 772 Monjitas, Chile, South America.)

Boletin Mensual de Observatorio Meteorologico Central de Mexico: Oficina Tipografica de la Secretaria de Fomento, (City of Mexico.)

Boletin de la Sociedad Agricole Mexicana, Imp. de la Secretaria de Fomento. (City of Mexico)

Boletin de Agricultura. Secretaria de Agricultura Commercio e obras Publicas do estado de Sao Paulo. (Sao Paulo, Brazil.)

Chronique Agricole du Canton de Vaud. Organe de l' Institute Agricole de Lausanne. Publie sous les auspices du Departement de l'Agriculture. (Lausanne, Switzerland.)

Consular Reports: Published monthly by the U. S. Department of State, Washington, D. C.

Experiment Station Record: Published monthly by Office of Experiment Stations, U. S. Department of Agriculture, Washington, D. C.

Journal of Agriculture and Industry of South Australia: Issued monthly under direction of the Hon. Ministers of Agriculture and Industry, Adelaide, South Australia.

Queensland Agricultural Journal: Issued by direction of the Secretary of Agriculture, Brisbane, Queensland, Australia.

U. S. Monthly Weather Review: Prepared under the direction of the Chief of the U. S. Weather Bureau, Washington, D. C.

AGRICULTURAL AND TRADE JOURNALS.

Acker und Gartenbau Zeitung, Milwaukee, Wis.
Agricultural Epitomist, Indianapolis, Ind.
Agricultural Student, Columbus, Ohio.
American Agriculturist, New York City.
American Farmer, Indianapolis, Ind.
American Grange Bulletin, Cincinnati, Ohio.
American Guernsey Cattle Club Herd Register, Petersboro, N. H.
American Sheep Breeder and Woolgrower, Chicago, Ill.
Beet Sugar Gazette, Chicago, Ill.
Boletin de Agricultura Tropical. San Jose de Costa Rica, C. A.
Breeder and Farmer, Zanesville, Ohio.
Breeder's Gazette, Chicago, Ill.
California Cultivator, Los Angeles, Cal.
Canadian Entomologist, London, Ontario, Canada.
Chicago Daily Drovers' Journal, Chicago, Ill.
Cincinnati Price Current, Cincinnati, Ohio.
Daily Drovers' Telegram, Kansas City, Mo.
Dairy and Creamery, Chicago, Ill.
Deutsch-Amerikanischer Farmer, Lincoln, Chicago and New York.
Deutsche Landwirtschaftliche Wochenschrift, Berlin, Germany.
Dorset Quarterly, Washington Pa.
Fanciers' Review and Fruit Grower, Chatham, N. Y.
Farm and Fireside, Springfield, Ohio.
Farm Home, The, Springfield, Ill.
Farmers' Advocate, London and Winnipeg, Canada.
Farmers' Guide, Huntington, Ind.
Farmers' Home, Dayton, Ohio
Farmers' Institute Bulletin, Fayetteville, N. Y.
Farmers' Review, Chicago, Ill.
Farmers' Tribune, Des Moines, Iowa.
Farmers' Voice, Chicago, Ill.
Farm, Field and Fireside, Chicago, Ill.
Farm Journal, Philadelphia, Pa.
Farm, Stock and Home, Minneapolis, Minn.
Fruit Growers' Journal, Cobden, Ill.
Fruit World, Los Angeles and San Francisco, Cal.
Gleanings in Bee Culture, Medina, Ohio.
Golden Egg, The, St. Louis, Mo.
Green's Fruit Grower, Rochester, N. Y.
Grele, La, Station Viticole, Villefranche, (Rhone) France.
Hoard's Dairyman, Fort Atkinson, Wis.
Holstein Friesian Register, Brattleboro, Vt.
Homestead, The, Des Moines, Iowa.
Hospodar (Bohemian), Omaha, Neb.
Indiana Farmer, Indianapolis, Ind.
Insect World (Japanese), Gifu, Japan.
Japanese Agriculturist (Japanese), Azabu, Tokio, Japan.
Jersey Bulletin, Indianapolis, Ind.

Journal of Agriculture, St. Louis, Mo.
La Laiterie Belge, Enghein, Belgium.
Live Stock Journal, Chicago, Ill.
Michigan Sugar Beet, Bay City, Mich.
Mirror and Farmer, Manchester, N. H.
Montana Fruit Grower, Missoula, Mont.
National Farmer and Stock Grower, National Stock Yards, Chicago, Ill.
National Fruit Grower, St. Joseph, Mich.
National Provisioner, New York, N. Y.
National Stockman and Farmer, Pittsburgh, Pa.
Naturaliste Canadian, Le, Chicoutimi, Quebec, Can.
North American Horticulturist, Monroe, Mich.
Northwest Horticulturist, Tacoma and Seattle, Wash.
Ohio Farmer, Cleveland, Ohio.
Oregon Agriculturist, Portland, Oregon.
Popular Agriculturist (Japanese), Tokyo, Japan.
Practical Dairyman, Chatham, N. Y.
Practical Farmer, Philadelphia, Pa.
Prairie Farmer, Chicago, Ill.
Revue des Cultures Coloniales, Paris, France.
Southern Planter, Richmond, Va.
Southern Farm Magazine, Baltimore, Md.
Statistical Sugar Trade Journal: Willett & Gray, 91 Wall St., N. Y. City.
Strawberry Specialist, Kittrell, N. C.
Sugar Beet, Philadelphia, Pa.
Tri-State Farmer and Gardener, Chattanooga, Tenn.
Wallace's Farmer, Des Moines, Iowa.
West Virginia Farm Reporter, Charleston, W. Va.
Western Creamery, San Francisco, Cal.
Western Fruit Grower, St. Joseph, Mo.
Western Tobacco Journal, Cincinnati, Ohio.

GENERAL NEWSPAPERS

From Ohio.

Barberton Leader, Barberton.
Cumberland Echo, Cumberland.
De Graff Journal, De Graff.
Fremont Journal, Fremont.
Geneva Free Press, Geneva.
Geneva Times, Geneva.
Greenville Democrat, Greenville.
Hardin County Republican, Kenton.
Jacksonian, Wooster.
Monroe Journal (German), Woodsfield.
New Waterford Magnet, New Waterford.
News Democrat, Georgetown.
Ohio State Journal, Columbus.
Press-Review, Payne.
Reveille Echo, East Palestine.
Saturday Whetstone, Barnesville.
Semi-Weekly Gazette, Delaware.
Shelby Times, Shelby.
Sugar Creek Budget, Sugarcreek.

Tiffin Weekly News, Tiffin.
Tipp Herald, Tippecanoe City.
Tuscarawas Chronicle, Uhrichsville and Dennison.
Wayne County Herald, Wooster.
Weekly Gazette, Cincinnati.

From Other States.

Baltimore Weekly Sun, Baltimore, Md.
Detroit Free Press, (Semi-weekly), Detroit, Mich.
Kansas Semi-Weekly Capital, Topeka, Kan.
Orilla Packet, Orilla, Ontario, Canada.
Public Ledger (Daily), Philadephia, Pa.
Rural Topics, Morgan City, La.
Salt Lake Herald (Semi-weekly), Salt Lake City, Utah.
Weekly Union, Manchester, N. H.

The station is also under obligations for the following favors:

SEEDS, PLANTS AND SUNDRIES.

Albright, B. F., Coalburg, O; one variety of potato.
Boyle, James, Salem, O.; one "Taylor Steel Stanchion."
Bucher & Gibbs Plow Co, Canton, O.; one Bucher & Gibbs plow.
Crawford, M., Cuyahoga Falls, O.; one variety of grape.
Doughton, H. W., Moorestown, N. J.; one gallon of "Fly Killer" oil.
Earhart, W. H, Lexington, O; apple cions.
German Kali Works, 93-99 Nassau St., New York City; samples of potash salts for fertilizer experiments.
Hale, J. H., South Glastonbury, Conn.; one variety of strawberry.
Hallock Weeder Co., York, Pa.; one Hallock Weeder.
Henderson & Co., Peter, New York City, seventy-five varieties of seeds.
Leggett Bros., New York City; one spray pump.
Mace, George W., Greenville, O.; four quarts of seed corn.
Miller, E. J., Millersburg, O.; four varieties of potatoes, one variety of strawberry.
Minor & Co., W. E., Cleveland, O.; five gallons of "Minor's Fluid."
McCormick, C. H., McCormick, O.; four quarts of seed corn.
Nichols, A. M., Granville, O.; one variety of tomato seed,
Orr & Cooper, Pittsburg, Pa.; three gallons of "Fly Killer."
Reid, James L., Delavan, Ill.; four quarts of seed corn.
Ripley Hardware Co., Grafton, Ill.; two gallons Ripley Fly Killer.
Sampsel, S. A., Clyde, O.; one variety of strawberry.
Sprague Commission Co., Chicago, Ill.; three gallons of "Fly Bouncer."
Seneca White Lime Co., Fostoria, O.; five barrels of ground lime.
Skillman, B. H., North Middletown, Ky.; two bushels blue grass seed in the chaff.
Teeter. D. M., Bellville, O.; one variety of strawberry.
Warren, John, Kingston, O.; one peck of Blue Ridge wheat.

Respectfully submitted,

CHAS. E. THORNE, Director.

APPENDIX.

BULLETINS

OF THE

Ohio Agricultural Experiment Station.

1900—1901.

CONTENTS.

	BUL.	PAGE
A condensed handbook of the diseases of cultivated plants in Ohio	121	1
Onion Smut: Preliminary experiments	122	71
Grape rots in Ohio	123	85
Experiments in the prevention of grape rot	123	94
The maintenance of fertility: Field experiments with fertilizers on corn, oats and wheat in 1899 and 1900	124	103
The maintenance of fertility: Field experiments with fertilizers on potatoes, 1894 to 1900	125	121
Sugar beet investigations in Ohio in 1900	126	133
Miscellaneous chemical analyses	127	175
Meteorological summary, press bulletins and index	128	219

BULLETIN

OF THE

Ohio Agricultural Experiment Station.

NUMBER 128. JUNE, 1901.

METEOROLOGICAL SUMMARY—PRESS BULLETINS—INDEX.

METEOROLOGICAL SUMMARY FOR 1900.

BY C. A. PATTON.

EXPLANATION OF TABLES.

The following tables contain statistics of temperature, rainfall, etc., for the year, and are compiled from data obtained by daily observations. T stands for "trace;"— less than .01 inch of rainfall. Temperature is given in degrees Fahrenheit.

Table I shows the daily rainfall at the Station during the year in inches and hundredths.

Table II shows the daily mean temperature for each day of 1900 and the monthly mean temperature with thirteen years' average.

Table III gives a comparison of the monthly mean temperature and rainfall for the Station, with thirteen years' average for the same.

Table IV gives a comparison of the monthly mean temperature and rainfall for the state, with thirteen years' average for the same.

Table V gives the monthly mean temperature and rainfall for the Station and State for 1900 with thirteen years' average for the same.

Table VI contains the mean temperature, the highest and lowest temperatures, with the range of temperature for each month; the number of clear, fair and cloudy days; the rainfall, snowfall and prevailing direction of wind, for the Experiment Station 1900.

Table VII contains the principal points of interest on temperature, state of weather and rainfall for the Station during the year and a grand summary for thirteen years.

Table VIII contains the principal points of interest on temperature, state of weather and rainfall for the State during the year and a grand summary for eighteen years.

The statistics for the State, and for this Station previous to 1893, are compiled from the publications of the Ohio Meteorological Bureau and State Weather Service, the thirteen years' average being computed from the observations of the Wooster Station of the Ohio Meteorological Bureau, now located on the grounds of the Experiment Station, one mile south of Wooster.

NOTES ON THE WEATHER AT THE STATION, 1900—SUMMARY BY MONTHS.

JANUARY.

The mean temperature for January was 30.2°, which is 2.9° above the Station average for January. The highest temperature, 54°, occurred on the 24th; the lowest,—5°, on the 31st. Cloudy weather prevailed. Rain or snow fell on seventeen days. The total precipitation was 2.78 inches, which is .51 inch below the Station average for January. The prevailing wind was southwest.

FEBRUARY.

The mean temperature for February was 25°, which is 2.7° below the Station average for February. The highest temperature, 65°, occurred on the 8th; the lowest,—10°, on the 27th. Cloudy weather prevailed. Rain or snow fell on fourteen days. The total precipitation was 2.74 inches, which is .40 inch below the Station average for February. The prevailing wind was west.

MARCH.

The mean temperature for March was 31.8°, which is 3.5° below the Station average for March. The highest temperature, 57°, occurred on the 6th; the lowest,—4°, on the 17th. Cloudy weather prevailed. Rain or snow fell on thirteen days. The total precipitation was 2.25 inches, which is 1.00 inch below the Station average for March. The prevailing wind was north northwest.

APRIL.

The mean temperature for April was 47.8°, which is 1° below the Station average for April. The highest temperature, 78°, occurred on the 29th; the lowest, 20°, on the 10th. Clear weather prevailed. Rain fell on six days. The total precipitation was 1.70 inch, which is .76 inch below the Station average for April. The prevailing wind was north.

MAY.

The mean temperature for May was 61.5°, which is 3.6° above the Station average for May. The highest temperature, 89°, occurred on the 16th; the lowest, 25°, on the 15th. Clear weather prevailed. Rain fell on eight days. The total precipitation was 2.23 inches, which is 1.96 inch below the Station average for May. The prevailing wind was northeast.

JUNE.

The mean temperature for June was 68.5°, which is .4° above the Station average for June. The highest temperature, 90°, occurred on 24th; the lowest, 44°, on the 4th. Fair weather prevailed. Rain fell on eleven days. The total rainfall was 3.71 inches, which is .29 inch below the Station average for June. The prevailing wind was north.

JULY.

The mean temperature for July was 72.6°, which is 1.7° above the Station average for July. The highest temperature, 95°, occurred on the 4th; the lowest, 44°, on the 1st. Clear weather prevailed. Rain fell on thirteen days. The total precipitation was 5.65 inches, which is 1.36 inch above the Station average for July. The prevailing wind was north and southwest.

AUGUST.

The mean temperature for August was 74°, which is 4.8° above the Station average for August. The highest temperature, 94°, occurred on the 7th; the lowest, 49°, on the 4th. Clear weather prevailed. Rain fell on twelve days. The total rainfall was 5.97 inches, which is 3.05 inches above the Station average for August. The prevailing wind was southwest.

SEPTEMBER.

The mean temperature for September was 67.1°, which is 3.7° above the Station average for September. The highest temperature, 89°, occurred on the 1st, 11th and 26th; the lowest, 41°, on the 19th. Clear weather prevailed. Rain fell on eight days. The total rainfall was 2.19 inches, which is .92 inch below the Station average for September. The prevailing wind was southwest.

OCTOBER.

The mean temperature for October was 58.9°, which is 8.5° above the Station average for October. The highest temperature, 86°, occurred on the 6th; the lowest, 30°, on the 18th. Clear weather prevailed. Rain fell on four days. The total rainfall was 2.10 inches, which is .42 inch below the Station average for October. The prevailing wind was south.

NOVEMBER.

The mean temperature for November was 40.6°, which is .7° above the Station average for November. The highest temperature, 69° occurred on the 1st; the lowest, 6°, on the 16th. Cloudy weather prevailed. Rain or snow fell on fourteen days. The total precipitation was 4.30 inches, which is .80 inch above the Station average for November. The prevailing wind was southwest.

DECEMBER.

The mean temperature for December was 30.7°, which is 1° below the Station average for December. The highest temperature, 55°, occurred on the 23rd; the lowest, 11°, on the 15th. Cloudy weather prevailed. Rain or snow fell on twelve days. The total precipitation was .99 inch, which is 1.38 inch below the Station average for December The prevailing wind was southwest.

METEOROLOGY—TABLE I—RAINFALL.

DAILY RAINFALL AND MELTED SNOW FOR 1900 AT EXPERIMENT STATION.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	.10	.05	.50			.31		.15			.13	
2	T	.05		.15		.05						
3		.05		T	T		T		.15			.02
4		.13	.20	T	T		.09		.04			.26
5	.60		.13				T					.06
6			.55			.78			.06	T		
7	.02					.46	T		.57	.60	T	.09
8		.68			.27	.17	.72			.13	.06	
9		.08			.10		.02		.51		.04	.01
10	.04		T									
11	1.01		.02	.42	T		.22				.04	T
12	.09	.30		T	T		.82	.15				T
13	.02	.45		T		T		.11			T	.03
14	.02	T	T			1.49					.01	T
15		T	.02					1.30			.10	T
16	.20	T	.10	.03			.16	.46		T		T
17		.05		.50			.85		T		.70	.02
18	.02		T	T	T		.40					.05
19	.02		.20		.24		1.06				.31	
20	.33		.02					1.00	.20		.40	
21		.30		.48		.06		.68			.28	
22		.10		.12		.03				.01	T	
23		.05					T	.02		1.36	.37	.03
24		.20				T	.18	.90			.68	
25	.05		.06			.06	.98	.06	T		.52	.02
26	T		.25			.28					.66	
27	T		T		.48			.81	T			.10
28	.05	.25			.16				.02		T	.30
29	.05		.10		.02	.02	.10	.33	.64		T	
30	.08		.10		.10		.05			T		T
31	.08				.86							T
Totals	2.78	2.74	2.25	1.70	2.23	3.71	5.65	5 97	2.19	2.10	4.30	.99
Averages	.09	.10	.07	.06	.07	.12	.18	.19	.07	.07	.14	.03

METEROLOGY—TABLE II—TEMPERATURE.

MEAN TEMPERATURE AT THE STATION FOR EACH DAY OF 1900.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	9.0	2 0	30.5	40.0	53 0	70.0	61.0	66.0	73.0	59.0	58.5	36.0
2	16.5	11.0	25.0	41.5	61.5	72.5	69.0	65.0	74.0	70 5	45.0	39.0
3	21.0	21.0	28.0	43.0	53.5	58.0	80.5	68.5	73.0	71.0	43.5	40.0
4	24.0	34.5	35.0	35.0	43.0	57.0	82.0	66.0	68.5	70.5	45.5	39.0
5	34.0	25.5	28.5	41.5	43 0	64.0	83.5	74.5	68.5	73.0	48.0	35.0
6	37.5	31.5	43.0	51.0	52.5	70.0	82.5	80.5	76.5	73.0	40.5	34.0
7	41.5	43.0	34.5	60.0	61.5	72.5	83.0	80.0	73.5	65.5	40.0	35.5
8	37.5	57.5	33.5	34.0	71 5	72.0	72.0	78.0	71.5	54.5	33.0	38.0
9	33.5	38.0	40.5	33.0	51.0	59.5	63.5	77.0	75.0	50.0	31.5	26.5
10	36.0	29.0	40.5	30.5	45 0	65.5	65.5	78.0	74.5	48.5	34.5	21.0
11	33.5	32.5	30 0	31.5	61.0	72.5	76.5	80.0	77.0	49.5	36.0	22.5
12	31.5	39.0	24.5	37.0	67.0	63.5	65.5	79.0	71 5	54.5	33.0	22.0
13	31.5	37.5	36.5	34.0	71.0	73.0	65.5	74.5	64.0	56.5	40.0	32.0
14	37.5	24 5	28.5	39.0	74.5	71.0	69.0	74.5	63.5	57.0	27.0	21.0
15	40.5	24.0	22.5	46.5	75.0	65.0	77.5	61 0	66.5	55.0	23.0	16.5
16	39.5	16.5	15.5	56.5	71.5	63.0	79.0	72.0	63.5	53.5	20.5	21.5
17	36.0	11.0	6.0	57.0	73.0	65.0	80.5	74.0	53.0	46.5	34.0	23 5
18	43.0	7.5	29.5	64.0	64.5	65.0	74.5	76.0	56.5	48.5	51.5	35.5
19	46.5	16.5	41.5	56.5	57.5	61.5	75.0	77.0	58.5	49.5	60.0	36.0
20	40.0	20.5	30.5	54.5	52.0	64.5	74.5	77.5	64.0	49.5	60.0	28.0
21	34.0	37.0	28.0	57.0	54.0	68.0	71.0	74.5	66.0	59.5	50.0	29.0
22	38.5	32.5	36.5	62.0	58.5	71.0	71.5	71.0	55.0	66.0	50.5	42.0
23	41.0	33.0	42.5	56.5	64.5	72.5	77.0	73.0	61.5	67.0	50.5	47.0
24	40.0	17.5	30.5	55.5	65.5	75.0	74.	75.5	62.0	56.5	46.0	41.0
25	37.0	12.0	35.0	52.0	65.5	75.5	70.5	77.0	74.0	59.5	38.5	29.5
26	17.5	11.0	42.0	52.5	64.0	77.0	65.5	76.5	76.5	64.5	35.5	24.5
27	18.0	9.5	37.0	47.5	65.5	76.0	62.0	75.5	69.0	57.5	35.5	31.0
28	18.0	24.0	32.5	52.0	61.0	79.5	67.0	73.5	62.5	50.5	38.0	28.5
29	4.0	.....	30.5	58.0	65.0	73.5	73.5	78.5	63.5	59.5	35.0	23.0
30	15.0	.....	31.5	57.0	72.5	62.0	72.0	71.5	57.5	62.5	32.0	22.0
31	3.0	.....	34.5	.....	68.5	.....	69.0	69.5	.....	66.0	.....	33.0
Monthly mean	30.2	25.0	31.8	47.8	61.5	68.5	72.6	74.0	67.1	58.9	40.6	30.7
Thirteen-year av'age	27.3	27.7	35.3	48.8	57.9	68.1	70.9	69.2	63.4	50.4	39.9	31.7

METEOROLOGY—TABLE III.

MONTHLY MEAN TEMPERATURE AND RAINFALL FOR THIRTEEN YEARS AT WOOSTER.

Temperature in degrees Fahrenheit.

	January.	February.	March.	April.	May	June.	July.	August.	September.	October.	November.	December.	Year.
1888	23.0	28.4	31.7	46.3	57.7	68.9	70.1	67.8	57.1	44.9	40.7	31.4	47.3
1889	31.1	22.9	38.7	47.1	57 8	64.5	70.0	66.0	60.8	45.3	39.3	40.7	48.6
1890	36.0	36.6	30.9	48 4	56.0	69 8	70.5	65.8	59.6	50.0	41.3	28.8	49.5
1891	30.0	34 0	32 0	49.0	52.0	68.0	68.0	71.0	68.0	49.0	38 0	37.0	49.6
1892	22.0	33 0	33.0	47.0	57.0	70.0	70.0	69.0	61.0	49.0	38.0	28.0	48.0
1893	18.0	28.0	38.0	50 1	57.6	69.3	72.0	67.9	63.2	52.3	37.7	30 9	48.7
1894	32.8	26.7	43.5	50 5	57.5	67 9	71.4	69.2	66.1	52.3	36.5	32.9	50.6
1895	21.9	17.9	32.4	49.5	59.4	69.9	68.6	70.9	66.5	44.2	40.4	32.8	47.8
1896	27.9	29.2	29.8	54.6	64.5	65.6	70.2	68.5	60.6	45.8	44.4	30.6	49.8
1897	24.0	30.0	39.3	47.2	53.4	64.3	73.2	67.0	66.7	55.9	40.7	31.8	49.4
1898	31.6	27.4	43.3	45.3	58.2	68.7	74.5	71.1	66.2	52.6	38.4	27.9	50.4
1899	26.6	21.3	35.0	52.1	60.0	69.4	70.0	71.0	61.6	55.0	43.2	29.0	49.5
1900	30.2	25.0	31.8	47.8	61.5	68.5	72.6	74.0	67.1	58.9	40.6	30.7	50.7
Averages	27.3	27.7	35.3	48.8	57.9	68.1	70.9	69.2	63.4	50.4	39.9	31.7	49.1

Rainfall—Inches.

1888	3.52	2.43	3.34	2.48	3.82	2.31	4.54	4.35	1.92	3.18	4.95	1.39	3.18
1889	4.33	2.42	2.13	1.58	2.97	4.86	6.73	1.98	4.05	1.36	3.53	3.93	3.32
1890	4.71	6.20	4.37	3.10	6.01	5.57	2.67	4.66	5.12	7.45	2.61	1.74	4.51
1891	2.74	4.83	3.71	1.66	2.24	7.13	3.28	1.85	0.94	1.33	5.73	2.92	3.20
1892	2.67	2.67	3.38	2.44	7.69	7.89	4.73	2.69	3.20	0.37	2.06	1.74	3.46
1893	4.01	6.33	1.89	5.66	6.28	2.51	1.38	1.53	1.85	5.18	2.49	1.50	3.38
1894	2.19	3.37	2.36	1.74	4.41	2.23	1.38	0.76	4.07	2.53	2.41	3.15	2.55
1895	3.92	1.00	1.98	1.69	1.38	4.20	2.19	2.30	3.92	1.15	4.21	3.51	2.62
1896	1.73	2.27	3.67	3.34	3.41	3.98	8.05	1.96	5.16	0.71	1.78	2.41	3.21
1897	2.82	2.64	2.81	2.75	4.97	2.98	3.89	3.86	0.29	0.89	5.76	2.50	3.01
1898	4.10	2.27	6.44	2.56	4.60	2.70	6.79	5.53	2.15	4.28	4.14	2.29	3.99
1899	3.29	1.64	3.95	1.28	4.42	1.95	3.73	0.53	5.56	2.21	1.59	2.78	2.74
1900	2.78	2.74	2.25	1.70	2.23	3.71	5.65	5.97	2.19	2.10	4.30	.99	3.05
Averages	3.29	3.14	3.25	2.46	4.19	4.00	4.29	2.92	3.11	2.52	3.50	2.37	3.25

METEOROLOGY—TABLE IV.

MONTHLY MEAN TEMPERATURE AND RAINFALL FOR THIRTEEN YEARS FOR THE STATE.

Temperature in degrees Fahrenheit.

	January.	February.	March.	April.	May.	June	July.	August.	September.	October.	November.	December.	Year.
1888	24.3	30.5	34.2	49.2	59.1	70.4	72.1	70.4	60.3	47.9	42.9	33.3	49.5
1889	33.3	25.8	40.2	49.9	60.2	66.7	72.5	69.1	62.9	47.9	41.0	43.8	51.1
1890	38.8	39.4	34.5	51.3	59.2	73.3	73.1	68.8	62.1	52.7	43.9	31.2	52.3
1891	33.0	36.0	35.0	52.0	58.0	71.0	69.0	70.0	67.0	51.0	40.0	39.0	51.7
1892	24.0	35.0	35.0	49.0	59.0	73.0	73.0	71.0	64.0	52.0	38.0	29.0	50.1
1893	18.0	29 0	38.0	50.2	58.3	70.6	74.5	70.7	65.2	53.7	39.3	32.7	51.6
1894	37.7	28 9	45.1	50.6	60.0	71.3	74.3	71.2	67.8	53.9	37.5	33.9	52.3
1895	23.4	19.6	35.5	51.7	61.1	72.0	71.6	73.5	69.0	46.9	41.3	33.9	49.9
1896	29.4	30.5	32.4	56.7	67.9	69.5	73.2	71.8	62.7	49.0	45.1	32.9	51.7
1897	25.5	32.4	41.5	49.3	46.3	68.1	75.5	69.4	66.9	58.1	42.2	32.8	50.6
1898	32.4	30.0	45.0	47.2	61.0	71.9	76.0	73.5	67.8	53.1	38.8	28.8	52.1
1899	27.8	21.6	36.9	53.3	63.3	71.5	74.1	73.7	64.1	57.4	43.9	30.2	51.5
1900	31.1	26.0	32.9	50.1	62.9	69.8	74.1	76.3	69.3	60.5	41.6	31.6	52.3
Averages	28.7	29.6	37.4	50.8	59.7	70.7	73.3	71.5	65.3	52.6	41.2	33.2	51.3

Rainfall—Inches.

1888	3.65	1.74	3.55	1.99	3.77	3.41	4.40	5.16	2.27	3.98	4.25	1.47	3.30
1889	3.13	1.35	1.50	1.79	3.71	4.13	4.25	1.50	3.62	1.78	4.02	2.81	2.79
1890	4.94	5.25	5.29	3.15	5.52	4.50	1.99	4.70	5.56	4.27	2.53	2.37	4.17
1891	2.82	4.91	4.19	2.13	2.20	4.82	3.82	3.07	1.50	1.76	5.00	2.39	3.21
1892	2.05	3.27	2.16	2.63	4.63	6.73	3.13	6.15	1.27	0.67	2.62	1.85	3.09
1893	2.56	5.13	2.09	6.37	4.97	3.34	2 49	2.17	1.57	4.24	2.09	2.61	3.30
1894	2.14	2.79	2.16	2.31	4.00	2.65	1.56	1.67	3.31	2.01	2.17	2.98	2.47
1895	4.00	0.69	1.59	2.11	1.80	2.44	2.00	2.96	1.66	1.22	4.11	3.85	2.37
1896	1.67	2.25	3.34	2.78	2.67	4.81	8.11	3.38	5.13	1.20	2.63	1.65	3.29
1897	1.93	3.64	5.17	3.27	3.93	2.85	4.65	2.72	0.78	0.64	6.62	2.39	3.21
1898	5.25	2.32	6.23	2.32	4.10	2.86	3.98	4.50	2.56	3.72	3.17	2.71	3.65
1899	3.01	2.11	4.66	1.68	4.32	2.96	4.18	1.82	2.69	2.14	1.72	3.16	2.87
1900	2.37	3.53	2.35	1.89	2.40	2.99	4.62	3.68	1.76	1.89	4.15	1.24	2.74
Averages	3.04	3.42	3.40	2.65	3.69	3.71	3.78	3.34	2.51	2.27	3.46	2.42	3.11

METEOROLOGY—TABLE V.

MEAN TEMPERATURE AND RAINFALL FOR THE STATION AND STATE FOR 1900 AND FOR THIRTEEN YEARS.

Temperature in degrees Fahrenheit. Rainfall in inches.

	January.	February.	March.	April.	May	June.	July.	August.	September.	October.	November.	December.	Year.
Mean temperature at the Station, 1900	30.2	25.0	31.8	47.8	61.5	68.5	72.6	74.0	67.1	58.9	40.6	30.7	50.7
Thirteen years' average temperature at the Station	27 3	27.7	35.3	48.8	57.9	68.1	70.9	69.2	63.4	50.4	39.9	31.7	49.1
Mean temperature for the State, 1900	31.1	26.0	32.9	50.1	62.9	69.8	74.1	76.3	69.3	60.5	41.6	31.6	52.3
Thirteen years' average temperature for the State	28.7	29.6	37.4	50.8	59.7	70.7	73.3	71 5	65.3	52.6	41.2	33.2	5.13
Rainfall at the Station, 1900	2,78	2.74	2.25	1.70	2.23	3 71	5.65	5.97	2.19	2.10	4.30	0.99	3.05
Thirteen years' average rainfall at the Station	3.29	3.14	3 25	2.46	4.19	4.00	4.29	2.92	3.11	2.52	3.50	2 37	3.25
Rainfall for the State, 1900	2.37	3.53	2.35	1.89	2.40	2.99	4.62	3.68	1.76	1.89	4.15	1.24	2.74
Thirteen years' average rainfall for the State	3.04	3.42	3.40	2.65	3 69	3.71	3.78	3.34	2.51	2.27	3.46	2.42	3.11

METEOROLOGY TABLE VI.

SUMMARY BY MONTHS FOR 1900.

	Temperature.											Number of days.				Monthly rainfall.	Average daily rainfall.	Monthly snowfall.	Prevailing wind.
	Mean.	Highest.	Date.	Lowest	Date.	Range.	Mean daily range.	Greatest daily range	Date.	Least daily range.	Date.	Clear.	Fair.	Cloudy.	Rain fell .01 or more.				
At the Station—																			
January	30.2	54	24	—5	31	59	14.8	30	25	5	13	7	7	17	17	2.78	.09	4.00	S. W.
February	25.0	65	8	—10	27	75	19.0	38	28	4	21	8	3	17	14	2.74	.10	5.80	W.
March	31.8	57	6	—4	17	61	18.7	33	*1	5	30	7	6	18	13	2.25	.07	4.00	N-N.W.
April	47.8	78	29	20	10	58	21.1	40	29	8	17	12	10	8	6	1.70	.06	T	N.
May	61.5	89	16	25	15	64	26.6	43	6	11	31	17	6	8	8	2.23	.07	T	N. E.
June	68.5	90	24	44	4	46	22.6	37	10	12	1	11	17	2	11	3.71	.12	.....	N.
July	72.6	95	4	44	1	51	23.5	38	*2	5	25	14	12	5	13	5.65	.18	.....	N.S W.
August	74.0	94	7	49	4	45	23.2	35	31	15	27	18	11	2	12	5.97	.19	.....	S. W.
September	67.1	89	3	41	19	48	23.4	35	19	8	20	22	5	3	8	2.19	.07	.....	S. W.
October	58.9	86	6	30	18	56	24.8	38	15	11	7	21	9	1	4	2.10	.07	.....	S.
November	40.6	69	1	6	16	63	16.8	35	4	2	20	6	3	21	14	4.20	.14	2.50	S. W.
December	30.7	55	23	11	15	44	12.9	26	21	—6	5	6	9	16	12	0.99	.03	4.40	S. W.
Sums and averages	50.7	76.8	.....	21	.....	55.8	20.6	36	.....	8	.....	149	98	118	132	3.05	.10	20.70	S. W.
For the State—																			
January	31.1	67	23	—20	29	87	.....	41	26	.....	.....	8	7	16	9	2.37	.08	.....	S. W.
February	26.0	80	8	—20	27	100	.....	57	9	.....	.....	6	9	13	12	3 53	.13	.....	W.
March	32.9	70	13	—9	12	79	.....	49	17	.....	.....	8	8	15	10	2.35	.08	.....	W.
April	50.1	87	29	15	9	72	.....	50	29	.....	.....	14	8	8	8	1.89	.06	.....	S. W.
May	62.9	97	15	20	10	77	.....	54	6	.....	.....	18	11	7	8	2.40	.08	.....	S. W.
June	69.8	96	*6	38	30	58	.....	50	*7	.....	.....	12	11	7	10	2.99	.10	.....	S. W.
July	74.1	103	4	38	1	65	.....	51	2	.....	.....	15	12	4	11	4.62	.15	.....	S. W.
August	76.3	103	*8	40	4	63	.....	46	*9	.....	.....	17	11	3	9	3.68	.12	.....	S. W.
September	69.3	100	*10	33	19	67	.....	45	25	.....	.....	16	9	5	5	1.76	.06	.....	S. W.
October	60.5	93	*11	23	20	70	.....	49	20	.....	.....	18	8	5	5	1.89	.06	.....	S. W.
November	41.6	80	1	.....	16	80	.....	46	23	.....	.....	8	7	14	12	4.15	.14	.....	S. W.
December	31.6	65	22	—2	17	67	.....	40	22	.....	.....	8	7	16	8	1.24	.04	.....	S. W.
Sums and averages	52.2	86.8	.....	13	.....	73.7	.....	48.2	.....	.....	.....	143	109	113	107	2.74	.09	.....	S. W.

Station. *1 March 12th, 18th. *2- July 2d and 11th. *3- September 1st, 11th and 26th. *5 December 4th, 5th and 21st.

State. *6- June 24th and 26th. *7- June 10th and 13th. *8 August 6th and 10th. *9- August 5th and 31st. *10 Sept. 8th, 9th and 10th. *11- Oct. 3d and 5th.

METEOROLOGY—TABLE VII.

SUMMARY BY YEARS AND GRAND SUMMARY FOR THIRTEEN YEARS AT WOOSTER.

	1888.	1889.	1890.	1891.	1892.	1893.	1894.
At	Wooster.	Wooster.	Wooster.	Wooster.	Wooster.	Experiment Station.	Experiment Station.
Mean temperature	47.3°	48.6°	49.5°	49.6°	48.0°	49.7°	50.6°
Highest temperature		91.5 *1	94.5° Aug. 3	99.0° Aug. 8	98.0° July 25	93.° *5	98.° July 19
Lowest temperature	—5° Feb. 9	—5 *2	1.° March 7	0.° March 1	—20.° Jan. 20	—9.° Jan. 11	—7.° Dec. 28
Range of temperature		96.5°	93.5°	99.°	118.°	104.°	105.°
Mean daily range of temperature		18.7°	18.9°	21.°	19.°	20.2°	22.9°
Greatest daily range of temperature		42.° April 23	41.° Jan. 13	42.° Sept. 23	46.° July 7	45.° Aug. 9	45.° July 31
Least daily range of temperature		2.° Jan. 6	4.5° *3	4.° Feb. 8	4.° *4	3.° *6	4.° *7
Number of clear days		125	109	116	116	96	127
Number of fair days		103	119	110	123	164	154
Number of cloudy days		137	137	125	98	105	84
Number of days rain fell		119	149	119	119	129	130
Total rainfall	38.23 inches	39.87 inches	54.21 inches	38.36 inches	41.46 inches	40.61 inches	30.60 inches
Greatest monthly rainfall	4.54 inches	6.73 in.—July	7.45 in.—Oct.	4.26 in.—June	7.89 in.—June	6.33 in.—Feb.	4.41 in.—May
Least monthly rainfall	1.39 inches	1.36 in.—Oct.	1.74 in.—Dec.	1.95 in.—April	1.37 in.—Oct.	1.38 in.—July	0.76 in.—Aug.
Prevailing direction of wind	S	S	S	S	S. W.	S. W.	S. W.

*1 July 10. Sept. 1. *2 Feb. 23 and 24. *3 Jan. 8 and Sept. 10. *4 March 5, Nov. 1, 3, 25 and Dec. 1 and 18. *5 July 7, 25 and Sept. 7. *6 Jan. 24, Feb. 11, May 26. *7 Dec 1, 23.

METEOROLOGY—TABLE VII—Concluded.

SUMMARY BY YEARS AND GRAND SUMMARY FOR THIRTEEN YEARS AT WOOSTER.

At	1895. Experiment Station.	1896. Experiment Station.	1897. Experiment Station.	1898. Experiment Station.	1899. Experiment Station.	1900. Experiment Station.	Summary for thirteen years.
Mean temperature	47.8°	49.6°	49.4°	50.4°	49.5°	50.7°	49.2°
Highest temperature	98.° June 4	93.° Aug. 9	96.° *10	96.° July 3	95.° Aug. 20	95.° July 4	99.° Aug. 8, 1891
Lowest temperature	—6.° *8	—6° Feb. 19	—18.° Jan. 26	—9.° Feb. 2	—21 ° Feb. 10	—10.° Feb. 27	—21.° Feb. 10, 1899
Range of temperature	104.°	99.°	114.°	105.°	116.°	105.°	120.°
Mean daily range of temperature	21.8°	19.°	21.5°	20.3°	22.9°	20.6°	20.6°
Greatest daily range of temperature	55.° Oct. 6	43.° May 8	49.° Oct. 5	50.° Nov. 14	52.° Oct. 24	43.° May 6	55.° Oct. 6, 1895
Least daily range of temperature	1.° Nov. 27	3.° *9	0.° Feb. 6	5.° *11	3.° Feb. 18	2.° Nov 20	0.° Feb. 6, 1897
Number of clear days	125	130	124	133	126	149	123
Number of fair days	117	106	123	104	114	98	120
Number of cloudy days	123	130	115	128	125	118	119
Number of days rain fell	102	134	128	134	116	132	126
Total rainfall	31.45 inches	38.47 inches	36.16 inches	47.85 inches	32.93 inches	36.61 inches	39.91 inches
Greatest monthly rainfall	4.21 in. Nov.	8.05 in. July	5.76 in. Nov.	6.79 in. July	5.56 in. Nov.	5.97 in. Aug.	8.05 in. July, 1896
Least monthly rainfall	1 00 in. Feb.	0.71 in. Oct.	0.29 in. Sept.	2.15 in. Sept.	0.53 in. Aug.	.99 in. Dec.	.29 in. Sept., 1897
Prevailing direction of wind	N.	S. W.	N. W.	N.—S. W.	S.	S. W.	S.—S. W.

*8. Jan. 12, 13 and Feb. 5. *9. Jan. 10 and March 8. *10. July 5 and 6. *11. Jan. 21, March 2 and Dec. 18.

METEOROLOGY—TABLE VIII.

SUMMARY BY YEARS AND GRAND SUMMARY FOR EIGHTEEN YEARS FOR THE STATE.

For the State.	1883	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	Summary for eighteen years.
Mean temperature	49.4°	50.6°	48.0°	49.6°	51.4°.	49.5°	51.1°	52.4°	52.°	.....
Highest temperature	98.° Aug. 22	99° *1-	101.° July 21	98.6° July 7	108.° July 18	102.° Aug. 3	99.5° Aug. 31	103.1° Aug. 3	101.° Aug. 10	.....
Lowest temperature	-17.2° Jan. 22	-34° Jan. 25	-31.° Jan. 29	-21.5° Jan. 12	-21.° Jan. 7	-15.° Jan. 27	-13.5° Feb. 24	-4.° March 7	-5.° Mar. 5.	....
Range of temperature	115.5°	133.°	132.°	120.1°	129.°	117.°	113.°	107.1°	106.°	.....
Greatest daily range temp'tre	55.2° Mar. 18	50° *2	58.5° Jan. 30	57.° Dec. 11.	57.° April 11	50.°	53.° Mar. 30	49.5° Apr. 11	50.° *3	.....
Average numb'r days rain fell	146	145	148	131	121	125	115	149	120	.....
Mean yearly rainfall	44.98 inches.	40 19 inches	38.08 inches	36.71 inches	33.63 inches	39.64 inches	33.53 inches	50.33 inches	38.61 inches	.....
Mean daily rainfall	.123 inch.	.110 inch.	.104 inch.	.100 inch.	.049 inch.	.108 inch.	.092 inch.	.138 inch.	.110 inch.	....
Prevailing wind	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	....

	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	
Mean temperature	50.°	50.1°	52.4°	49.9°	51.8°	50 6°	52.°	51 5°	52.2°	50.8°
Highest temperature	103°. July 25	102.° June 19	105.° *4	106.° July 20	103.° Apr. 17	113.° July 4	105.° July 1	105.° Sept. 6	103.° *8-	113.° July 4, '97
Lowest temperature	-25.° Jan. 20	-24.°	-27.° Dec. 29	-24.° Feb. 6	-18.° *6-	-27.° Jan. 26	-20 ° Feb. 3	-39.° Feb. 10	-20.° *9-	-39.° { Feb. 10, 1899.
Range of temperature	123.°	126.°	132.°	130.°	121.°	140.°	125.°	144.°	123 °	125.°
Greatest daily range temp'tre	-51.° Sept. 25	54.6°	60.° Oct. 19	59.° *1-	53 ° Mar. 25	67.° *7-	.....	.....	57.° Feb. 9	67.° { Sep. 28, 1897.
Average numb'r days rain fell	121	113	150	89	124	110	121	107	107	127
Mean yearly rainfall	37.16 inches	39.63 inches	29 75 inches	28.46 inches	39.58 inches	38.54 inches	43.78 inches	31.51 inches	32.87 inches	37.78 inches
Mean daily rainfall	.10 inch.	.110 inch.	.080 inch.	.070 inch.	.120 inch.	.100 inch.	.119 inch.	.994 inch.	.091 inch.	.101 inch.
Prevailing wind	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.	S. W.

*1- Sept. 28th and Oct. 1st. *2 Sept. 5th and Dec. 4th. *3 April 27th and 30th. *4 July 18th and 19th. *5 Jan. 15th and Mar. 29th. *6- Feb. 9th, 10th, and 11th. *7 Sept. 25th and 26th. *8- July 4th, Aug. 6th and 10th. *9- Jan. 29th and Feb. 27th.

This page intentionally blank.

PRESS BULLETINS.

The following press bulletins have been issued during the year:

No. 212, July 9, 1900: PRESENT SITUATION IN OHIO WITH RESPECT TO THE RAVAGES OF THE CHINCH BUG. [Fourth Edition.]

The pest is now working its greatest injury in Clermont, Brown, Fayette, Madison, Highland, Clinton and Warren counties, the damage being in the order in which they are named. For this reason, and to meet the present emergency, this bulletin has been prepared by the Ohio Agricultural Experiment Station.

REMEDIAL AND PREVENTIVE MEASURES.

With millions of bugs in his field or swarming from out of an adjoining field, either of his own or his neighbors, what is a farmer to do? Usually it is not until such conditions prevail that the farmer becomes aware that there is a chinch bug within miles of his field, and after having learned of their immediate presence, he almost invariably waits to see what they are going to do, and by the time he finds out, they have become diffused over so large an area as to make any effort to control them rather a stupendous affair. If, then, the bugs are gathered on the outer rows of corn, as is usual in the larger portion of Ohio, they having left the wheat fields for the corn as soon as the grain was harvested, follow the directions given in a circular letter, June 24, 1895, by Prof. S. A. Forbes, State Entomologist of Illinois, which is as follows:

"Dissolve one-half pound of hard or soft soap in one gallon of water, and heat to the boiling point. Remove from stove and add two gallons of coal oil, churning the mixture with a good force pump for fifteen minutes. When the emulsion is formed, it will look like buttermilk.

"To each quart of this emulsion add fifteen quarts of water, and apply to the corn in a spray—preferably before 10 A. M. or after 3 P. M. The bugs should be washed off so that they will float in the emulsion at the base of the plant. A teacupful is generally sufficient, but the quantity must vary with the number of bugs infesting the corn."

That the above is effective and of practical value, we know from personal experience, and many fields in central Ohio can be thus protected, if the effort is made to do so and at the proper time.

If the bugs have taken possession of more than one of the outer rows of corn, put in the plow and turn under a strip along the edge where the bugs were congregated, promptly harrow it down smooth and roll or pack the surface of the ground with a clod crusher. Bury a chinch bug under three or four inches of soil and it will not crawl out, as I have learned by actual experiment in the field. This applies to corn; there is no way of treating the pest in the wheatfield or meadows. I once tried to use the emulsion among wheat, drenching the small patches of whitening straw when these began to show in the field, but could not see that any good resulted from the application.

So far as remedies are concerned, then, we can only recommend the use of kerosene emulsion, and in more serious cases the plowing of the infested area followed by harrowing and rolling.

In case a migration is in progress from a wheatfield to a cornfield, if about three deep furrows are plowed as closely side by side as possible, the invasion may be stopped. A few bugs will get in and climb out of the first furrow, but less will succeed in passing the second, while the third will stop about all of these. If there are so many that they seem to be escaping after a few days fill up the trenches with a plank clod crusher or scraper, level off and roll, making new furrows where the ridges were between the old furrows, and you have a new series of obstructions.

A combination of the trench and emulsion measures has been tried this year with perfect success. A deep furrow was plowed and cleared out and when it became well filled with bugs and as soon as any began to cross it, it was thoroughly drenched with the kerosene emulsion and all that had fallen into it were quickly killed.

If the outer rows of corn are grown up with foxtail or panic grass, the bugs will largely remain on that in preference to going farther, or if a strip of millet be sown along the margin between the two fields, so as to have it up several inches by the last of June, or about harvest, this will cause a halt in the migrating hordes, and keep them engaged in feeding on the growing millet until the food supply begins to fail, when they will move onward. If about this time the farmer will put in his plow and turn under bugs, grass and all, and harrow and roll the ground, he will leave so few bugs above ground that they will cause little if any injury. This has been tried where the strip of millet was displaced by foxtail and panic grass, and we know that it will work effectually.

Where neither of the foregoing measures are practicable, and a prompt defense is necessary, a barrier of tarred boards may be used, and a mixture of nine parts of coal-tar and one part linseed oil, thoroughly mixed and spread upon boards either laid flat on the ground, or placed on edge and the upper edge daubed with the mixture. Where the line of defense is not too long, and one has the boards at hand, this may serve to hold the bugs in check for a time, but if one is obliged to purchase the lumber the expense will be a serious objection. In some cases a ridge has been thrown up and made smooth and compact on top, the tar mixture being applied on this in a train with a watering pot without the sprinkling attachment. The trouble here is that the wind blows the dust over this train of oil and tar, soon crusting over the surface so that the bugs crawl over it without sticking fast. If taken in time the application of kerosene emulsion will stop an invasion in a cornfield, while if ground over which the bugs are passing is plowed and the vegetation thoroughly covered, so that the bugs may not, by following the grass and weeds, make their way to the surface, the more serious invasions may be overcome. It is not necessary to destroy every individual bug, and if the number has been reduced so as to ward off material injury, then the object has been accomplished.

THE CHINCH BUG FUNGUS.

With favorable meteorological conditions, the threadlike branches of the fungus will take possession of the interior of the bug. When the bug dies, branches are pushed out through the body and produce clusters of minute capsules filled with spores. Sometimes these clusters are so thick on the dead bugs as to almost obscure the body, and only the legs are visible, or the bugs may be clustered on a plant, dead and covered with fungus. Now, as these capsules containing the spores burst, they release the spores and these may be still further diffused by the wind, so that it is easy to see how one diseased bug among a mass of several hundred may affect the whole of them, and if some of the infected ones, before becoming helpless, stray to a distance, the infection is carried from place to place and in this way diffused from field to field. Thus it will be observed that however easily

large masses of bugs may be destroyed by this fungus enemy, under favorable conditions, the prospect of its working is not very encouraging if either the bugs are badly scattered or the weather is dry.

DIRECTIONS FOR USING THE FUNGUS.

We are sending out this fungus this year, cultivated artifically in a mixture of beef broth and corn meal, which saves much time and expense in securing and transporting the bugs to and from the Station. *Those who receive this are instructed to cut the mass contained in each box into bits the size of an ordinary pin head and drop these bits among the bugs, where these are massed in greatest numbers, preferably on low or damp ground.* The other measures should on no account be neglected.

F. M. WEBSTER, *Entomologist.*

No. 213, July 22, 1900: A SEVEN-YEAR COMPARISON OF VARIETIES OF WHEAT.

About sixty differently named sorts of wheat are annually grown in comparative test at the Ohio Experiment Station. In this test the different varieties are grown on plots of one-tenth acre, the plots being arranged so that a standard variety, Penquit's Velvet Chaff, appears on every third plot in the series, and in computing the results the yield of a given variety is compared with that of the two plots of Velvet Chaff between which it grew.

The treatment of the crop is as nearly uniform for all the varieties as possible. The land was selected in the first place for its apparent uniformity; a tile drain is laid at one side of every plot; the plowing is done across the plots; all are manured alike with barnyard manure, distributed by a manure spreader, which also is driven across the plots, thus giving no opportunity for differences in time of plowing or manner of manuring to affect the yield, and the greatest possible care is taken in seeding, harvesting and threshing.

Below are the general results of this test for the seven years, 1893 to 1899, inclusive.

The following sorts have exceeded the Velvet Chaff in yield: Poole and Mealy by an average of more than four bushels per acre each; Red Russian by nearly four bushels; Nigger, Early Ripe, Currell's Prolific, Gypsy, and Egyptian by two to three bushels; Mediterranean, New Monarch and Democrat by one to two bushels, and Bearded Monarch, Valley, Deitz, Lebanon, and Hickman by less than one bushel each.

Of the sorts which have fallen below Velvet Chaff in average yield are Jones' Winter Fife, which has averaged more than three bushels less; Theiss and Silver Chaff, between two and three bushels less; Royal Australian (or Clawson), Early Red Clawson, Yellow Gypsy, Missouri Blue Stem, New Longberry, Lehigh and Martin's Amber between one and two bushels less, and Fulcaster, Hindostan and Early White Leader, whose average yield has been less than a bushel below that of Velvet Chaff.

These tests have been made on a rather thin, somewhat sandy clay. On gravelly loams the Valley has made a relatively larger yield than that quoted above.

No variety has proved exempt from attack by the Hessian fly, but Mealy, Mediterranean, Fulcaster and Clawson seem to suffer less from the fall attack of this insect than most other sorts.

The Ohio Station has never succeeded in growing spring wheat.

No. 214, July 30, 1900: A WARNING AGAINST FRAUD.

The Ohio Experiment Station has just received the following letter from Marion County:

"There is a company of men canvassing this territory for fruit trees. They are putting in what they call a 'model orchard.' They claim to be working

directly for and in the interest of your station, which gives them quite a leverage with a great many farmers"

To this letter we reply that this Station sells no fruit trees of any description, and all persons who claim to represent it in the manner indicated are swindlers and should be arrested for obtaining money under false pretenses.

No 215, August 13, 1900: SUGGESTIONS TO WHEAT GROWERS.

The almost unparaleled destruction of the wheat crop of 1900, throughout Ohio, Indiana and Michigan, is generally ascribed chiefly to the Hessian fly, and undoubtedly this insect has caused much loss, not only by destruction outright of many plants in the fall, but by so weakening the vitality of others that they succumbed to weather conditions which they would otherwise have been able to resist. But behind these causes there lies another which must not be lost sight of, namely, the exhaustion of soil fertility. The importance of this factor is shown in the experiments of the Ohio Station, in which wheat on new land has, this year, yielded nearly 40 bushels to the acre, without fertilizers, whereas unfertilized wheat on land that has been, for 60 or 70 years, under such cultivation as is practiced on a large proportion of Ohio farms, was almost totally destroyed by fly and weather conditions combined, the number of plants attacked by the fly being in both cases approximately the same.

Where the sowing of wheat has been delayed until after the middle of September in the extreme northern part of the State; to the 20th or 25th in the latitude of this Station; to the last week in the month in that of Columbus, and to the first week in October farther south, the results have been generally more favorable than where the seeding was done earlier; but these dates were not sufficiently late to escape the fly last fall, owing probably in part to peculiar seasonal conditions. When the seeding is delayed beyond the dates mentioned the loss from the plant not having time to sufficiently prepare for the winter will probably be greater than the average loss from the fly.

Even at these dates, in ordinary seasons, there will be need to see that the land is thoroughly prepared and well fertilized if remunerative yields are to be obtained.

Late sowing, however, while in some measure a protection from the fall attack of the fly, will have no effect on the spring attack unless universally practiced in a given district; for if one farmer in a township sows his wheat in time to invite the fall attack he will have provided a breeding place from which flies will swarm the following spring to destroy the crops of all his neighbors. It would seem, therefore, to be well worth while for farmers to take united action in this matter by banding together over large districts and agreeing to delay their wheat seeding until the dates suggested. Such a test, if properly carried out, would be of incalculable value in determining the actual value of this method of securing immunity from the fly.

If, in connection with a general postponement of the date of seeding, each farmer would sow a small strip of wheat at an earlier date, this to be plowed under with a jointer a few days before the general seeding and then resown, it might have a very useful effect in attracting the flies and causing them to deposit their eggs where they could be easily destroyed.

Many farmers are writing to the Experiment Station, asking whether it is advisable to sow rye instead of wheat this fall. To this we have to reply that rye is also subject to attack from the Hessian fly, while the statistics of crop production in Ohio show that the average yield of rye is no greater than that of wheat, and the market statistics show that its average value per bushel is much below that of wheat.

Our advice therefore is, in brief: Put the seed bed for wheat in the best possible condition by plowing early, thoroughly pulverizing the surface immediately to

retain moisture, and manuring or fertilizing liberally; then delay the seeding to a comparatively late date and use a liberal quantity of seed. The recent experiments of this Station show that two bushels of thoroughly cleaned seed is not too much for an acre of ordinary land.

No. 216, August 27, 1900: FERTILIZERS ON WHEAT.

In the tests of the Ohio Experiment Station, phosphoric acid, in the form of acid phosphate, has been decidedly the chief factor in producing increase of crop during the season just past. A similar result has been reached by many farmers, and the natural consequence is a general tendency to limit the use of fertilizers the coming season to plain acid phosphates; a tendency strengthened by the fact that the phosphates are not so completely under the control of the fertilizer trust as are the mixed fertilizers.

When, however, the experiments at the Ohio Station are studied as a whole, taking not simply the effect upon the present season's wheat crop, but the average results upon wheat, corn, oats and grass for the past seven years, it will be seen that it would be a decided mistake to base conclusions upon this one wheat crop alone.

In the experiments of the Central Station at Wooster, where wheat has been grown in rotation with corn, oats, clover and timothy, the average increase per acre from plain acid phosphate, applied at the rate of 160 pounds per acre to wheat and eighty pounds per acre to corn and oats, or a total of 320 pounds during the five years of a rotation, has been 4.6 bushels of wheat, 3.6 bushels of corn, 7.2 bushels of oats and 500 pounds of hay, while from the same quantity of acid phosphate, carried partly in acid phosphate and partly in tankage, but re-enforced by the nitrogen carried in the tankage and by a small addition of muriate of potash, the average increase has been 7.2 bushels of wheat, eight bushels of corn, eight bushels of oats and 1600 pounds of hay.

The cost of the acid phosphate used on an acre in five years has been about $2.40, while that of the mixture of acid phosphate, tankage and muriate of potash, has been about $3.75; but the average increase from this mixture has been so much greater than that from acid phosphate alone as to give a total net profit, over the cost of the fertilizer, of about $12 per acre in five years for the mixed fertilizer against about $6 for the acid phosphate used alone.

In mixing this fertilizer "seven and thirty" tankage and fourteen per cent. acid phosphate are used in equal quantities, adding about 100 pounds of muriate of potash to the ton. This gives a fertilizer analyzing over three per cent. ammonia, ten to twelve per cent. phosphoric acid and two and one-half per cent. potash, and may be made up at a cost of $18 to $20 per ton.

No 217, September 10, 1900: TUBERCULOSIS IN CATTLE.

By act of the last General Assembly of Ohio, the Agricultural Experiment Station is charged with the duty of conducting investigations to determine the prevalence and best methods of prevention of tuberculosis and other diseases of cattle throughout the state. In accordance with this provision the Station has employed a veterinarian to assist in carrying out the work thus authorized.

This work is simply one of research and education; in conducting it the Experiment Station has no authority to go upon any man's premises to inspect his cattle except upon his invitation; it cannot require him to destroy any animals except by mutual agreement, nor can it offer him any compensation for the loss of cattle from tubercular or other diseases.

The Experiment Station is able, however, to offer the assistance of the Station Veterinarian in the prevention and control of bovine tuberculosis, and through the co-operation of Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, United States Department of Agriculture, it is enabled to include the tuberculin diagnosis in this offer, under the following conditions:

Whenever evidence satisfactory to the Experiment Station is furnished that tuberculosis probably exists in a herd of five or more cattle within the state, the Station will test the entire herd with tuberculin, such test to be free of all cost to the herd owner except the board of the Station's agent while making the test (about two days for every herd of twenty animals or less) and his transportation to and from the nearest railway station. In some cases it may be possible to include two or more small herds, or several single animals, in a single test, by having these animals so placed near together that they may be easily tested.

In the ease of the state and county benevolent institutions, children's homes especially, the Station offers to make an annual tuberculin test of their herds without requiring any evidence of the appearance of tuberculosis as a prerequisite to such a test, the only requirement being the board and transportation of the Station's agent, as above mentioned.

When animals are found which show external evidences of the disease the owner will be advised to destroy them at once, as such animals are centers of infection to those around them and thus are sources of increasing loss. In the case of apparently healthy animals which react under the tuberculin test, the advice of the Station will be that they be slaughtered for beef under Governmental inspection, first fattening them for a few months if necessary. Experience has shown that fat and apparently healthy animals are occasionally found, on slaughter, to be in advanced stages of tuberculosis; but that many of the animals which react to to the tuberculin test when first made in a tuberculous herd, will be found to be in the incipient stages of the disease only, and these may be safely used for food if slaughtered under proper inspection, whereas if permitted to remain in the herd, they will soon become too far diseased to be thus used and will, moreover, become distributors of the infection.

When cattle are held in order to prepare them for slaughter, they should be kept entirely separate from all other animals—horses, sheep and swine as well as cattle—and the milk produced by them should be thoroughly sterilized before being used as food.

In the case of valuable pure bred cattle, the Station will advise the holding of slightly affected females until after dropping their calves, which should be at once taken from their dams and fed upon the milk of healthy cows.

That the cleaning out of a tuberculous herd may be effectual, the Station will recommend thorough disinfection of stables, and will give instructions in this work.

By the methods above indicated—destruction of a few badly diseased animals, and slaughter under inspection of a larger number which were found to be only in the first stages of the disease, followed by thorough disinfection of the stables, and feeding the calves upon the milk from healthy cows, or that which had been sterilized, this Station has built up in three years a herd of apparently healthy cattle upon a foundation in which nearly half the animals were found to be tuberculous. It is therefore with great confidence that we recomend this method to the cattle owners of Ohio and offer our services in carrying it out.

It should be distinctly understood that the Station does not propose to advertise the presence of tuberculosis in any particular herd of cattle. Its work, as stated above, is confined to investigation and to the rendering of assistance to the cattle owners of the state in ridding their herds of this destructive and dangerous disease, and this work will be so conducted as not to necessarily increase the misfortune of having the disease in the herd.

The Station cannot make inspections of breeding cattle for certification purposes. Where such inspection is desired, application should be made to local vet-

erinarians, accredited by the Secretary of the State Live Stock Commission, Dr. D. N. Kinsman, Columbus, O.

The foregoing offers are subject to modification or withdrawal at any time.

No. 218, September 17, 1900: ANNOUNCEMENT CONCERNING SUGAR BEETS.

The Ohio Agricultural Experiment Station has just mailed to the growers who received seed from the Station last spring, its announcement as to beet samples. Franked shipping tags, sampling directions and other descriptive blanks will be mailed to them about October 15th; growers will refrain from sending beet samples until after that time. These franked tags will carry packages not exceeding four pounds in weight by mail, free. As heretofore, the Chemical Department of the Experiment Station will analyze free of charge the sugar beet samples grown from the seed it distributed, when these are accompanied by proper description of the sample of beets.

Persons who have other sugar beets than above stated may arrange for analysis of them by writing to the Experiment Station, Wooster, O., before sampling. The Station declines to receive sugar beet samples by express unless charges are prepaid.

No. 219, November 26, 1900: OHIO SUGAR BEET WORK FOR 1900 AND 1901.

RESULTS OF SUGAR BEET INVESTIGATIONS IN 1900.

About 900 pounds of imported sugar beet seed of four varieties was supplied to the Ohio Agricultural Experiment Station by the United States Department of Agriculture for tests in the state during 1900. About 150 pounds additional was contributed by others. This seed was distributed to 203 applicants in sixty counties. In distribution, 107 of these recipients were in the northern section of the state; fifty-seven in the middle and thirty-nine in the southern. The seed was nearly all sent out during March, 1900, so that early planting could be made.

The analyses have now been completed by the Chemical Department and 286 samples are included, of which 209 are from the northern, fifty-seven from the middle, and twenty from the southern section. As heretofore the northern section shows the best results, or 11.4 per cent sugar in the beet and a purity of 77.9. For the entire state the sugar in the beet is 11.0 per cent., and the purity 77.1.

SUMMARY OF RESULTS OF OHIO SUGAR BEET ANALYSES IN 1900.

Section.	Number of samples.	Average weight of Beets, ounces.	Sugar in Beets, per cent.	Purity coefficient
Northern section	209	13.4	11 4	77 9
Middle section	57	19.7	10 9	77 5
Southern section	20	12.5	8.1	67 8
Entire state	286	13.8	11.0	77.1

On the whole the beets, previous inference to the contrary notwithstanding, are below those of last year in sugar content and purity, few counties that supplied a number of samples giving the factory requirement, an average of 12 per cent. sugar in the beet, and a purity of 80.0.

In 1899 the midseason was dry, while in 1900 this period was one of abundant rains; in both years the fall was warm and summer like It would appear that the rainy season was less favorable to rich beets than the dry period of 1899.

The bulletin giving results in full detail will be ready in January, 1901, and may be obtained upon request.

SUGAR BEET SEED FOR 1901.

The Ohio Experiment Station is again assured of a limited supply of beet seed, for use in Ohio, to be imported by the United States Department of Agriculture. Judging by our past experience as well as that of others, the season of 1900 was favorable to a good stand of beets; this applies to favorable soil and weather conditions. With this experience we again urge preparation of the soil intended for beets by fall or winter plowing *and subsoiling*, and that beet planting be done as early as practicable, say in March and April.

While the Experiment Station is unwilling to discriminate between citizens who may apply for seed in accordance with this announcement, it cannot advise farmers in the southern and middle sections of the state to pursue tests in growing sugar beets, since these sections, with the possible exception of the extreme northern counties of the middle area, are so much less favorably situated for beet growing than the northern section that the establishment of a successful beet-sugar industry in them is highly improbable. Experiments in the northern section are much more likely to lead to the establishment of successful beet-sugar factories. There is now a factory at Fremont, Sandusky county, drawing its supply from 2,700 acres chiefly in that and the adjacent counties, and to a limited extent in Henry and Defiance counties. A freight rate of 75 cents per ton is paid on some of these beets for a distance of about fifty miles including one transfer of roads. Any farmer, therefore, who is not more than sixty to seventy-five miles from Fremont could gain even more valuable experience by contracting for the minimum average with that factory and thus realize actual commercial experience with beets. This course is suggested for those in reach of the factory.

Thus by more concentration of effort in other portions of the northern section where beet growing promises to be more profitable, more good can be accomplished than by doing as in the past. With the establishment of this industry in Ohio, it is altogether likely that after 1901 the Station may change its form of sugar beet investigations to suit the altered conditions.

The Ohio Experiment Station is now ready to receive applications for sugar beet seed intended for planting in 1901.

Application cards are mailed to growers with this announcement and will be sent to others upon postal card request. It is the purpose to send out the beet seed in March, 1901. The amount sent to any person will be limited to twelve pounds.

No. 220, February 25, 1901: SEEDING LAWNS AND PERMANENT PASTURES.

Many inquiries are received at the Ohio Experiment Station for information respecting the best grasses for lawns and permanent pastures and for instructions in seeding. The Station has successfully established several lawns by the following method: As soon as the ground is dry enough to work in the spring it is plowed and thoroughly pulverized by harrowing and cross-harrowing until in the condition of a garden. Unless the soil is very rich it should be made so, either by the liberal use of manure or of a complete fertilizer, the latter being preferable because of the seeds of weeds and coarse grasses usually carried in manure. For lawn purposes the fertilizer should carry 4 to 6 per cent. nitrogen, 8 to 10 per cent. phosphoric acid and 6 to 8 per cent. potash, and should be used at the rate of 600 to 800 pounds per acre.

A mixture of equal weights of Kentucky Blue Grass and Red Top, with a pound of white clover seed to a bushel of the mixture, is then sown broadcast, at the rate of two or more bushels per acre of the mixed seed, and harrowed in with a fine-toothed harrow. If the ground should be very dry it may be rolled as part of the preparation for sowing, but the finishing touch should always be given with a smoothing harrow, or other fine-toothed harrow, as this leaves the surface in such condition as not to be so liable to be injuriously packed by rain as if finished with the roller.

The reason for mixing the Kentucky Blue Grass with Red Top is that the two grasses mature at different seasons, the Red Top reaching maturity some weeks later than the Blue Grass, thus keeping up a better succession through the season, while the Blue Grass is better adapted to the dryer and the Red Top to the moister portions of the land. The clover is not only useful in thickening the sod, but by its ability to gather nitrogen it assists the growth of grasses with which it is sown.

For permanent pastures no better grasses have been found by the Ohio Station than the varieties above recommended for lawns. Sown together they give a succession throughout the season and adapt themselves to differences in soil, thus giving much better results than if either be sown alone. The seed of these grasses is relatively expensive, however, and it is more economical to reduce the quantity of seed of these varieties and substitute a moderate quantity of red clover and timothy seed. The first year after seeding, the crop may be chiefly clover, and should be mown for hay. The second year it will be chiefly timothy, and after that the timothy will gradually disappear and the pasture grasses take its place. By this method of seeding not only will the first cost be reduced, but the clover will serve a most useful purpose in preparing the way for the grasses which are to follow. A mixture of equal weights of clover and timothy, sown at the rate of a bushel to six or eight acres, and cross sown with half a bushel to a bushel to the acre of mixed Blue Grass and Red Top, the whole harrowed in together, will make a fair seeding. In the case of pastures, as well as of lawns, the land should be manured or fertilized if not already rich, and here manure is the better material, if it can be obtained.

All old pastures or lawns should have an occasional dressing of manure or fertilizer. The object lessons in the scattered cattle droppings on the pastures demonstrate this point effectively. Such treatment will often thicken up the grass in an old lawn without reseeding, but if bare spots have made their appearance it will sometimes assist matters to apply a dressing of air-slacked lime, at the rate of a bushel to the square rod, work it into the surface with a sharp harrow, and after a few weeks reseed as for a new lawn.

No. 221, March 4, 1901: A BULLETIN ON PLANT DISEASES.

The discovery that the smuts, mildews, rots and other diseases which cause such enormous losses every year are largely due to the growth of fungous parasites is a matter of recent date, and no part of the work undertaken by the agricultural experiment stations has yielded results of greater practical value than the demonstration that many of these diseases may be controlled by methods within easy reach of the ordinary farmer and fruit grower.

This work has been going on for ten or twelve years past. Its results are scattered through a multitude of bulletins, many of which are now out of print, or are unknown to the ordinary reader. For this reason the Ohio Experiment Station has collected, in a single bulletin, the chief results of its own work and that of other similar institutions, under the title: "A Condensed Handbook of the Diseases of Cultivated Plants in Ohio." This bulletin, No. 121, contains a brief description of the general characteristics of parasitic fungi, followed by an alphabetical list of the plants in ordinary cultivation, with the diseases to which they are most subject, and suggestions for treatment.

The bulletin also contains a reprint of the "Spray Calendar," originally published by the Station at the request of the State Horticultural Society. The object of the bulletin is to give descriptions of the various plant diseases sufficiently full to enable the non-technical reader to recognize them readily. It contains numerous illustrations of disease forms, and its many references to original publications serve as a very complete index to the literature of this newest of the branches of applied science.

No. 222, March 11, 1901: TUBERCULOSIS OF CATTLE.

As announced last Fall, the Ohio Experiment Station is prepared to apply the tuberculin test to cattle suspected of being affected with turberculosis, the test being made without cost to the owner of the cattle, except the board of the Station's agent during the two days required to make the test, and his transportation to and from the nearest railway station.

Under this offer the Station has thus far tested thirteen herds, containing 279 cattle, with the result that six herds were found to be entirely free from turberculosis, while in the remaining herds there were eighteen cases of positive reaction to the tuberculin test. Five of these eighteen cattle were immediately killed by their owners and examined by the Station Veterinarian, the result of the autopsy confirming the accuracy of the tuberculin diagnosis in every instance. In other cases the owners have been advised to fatten the animals, in the hope that the disease would prove not to have become sufficiently generalized to affect the meat.

It will be observed that nearly half the herds examined proved to be entirely free from disease. One of these herds belonged to a children's home, and others were dairy herds in which occasional coughing or other temporary indisposition had caused some anxiety. In four other cases only one or two animals were found affected, and the owners were enabled by the test to at once separate such animals from the herd, distinfect their stalls, and probably prevent further spread of the disease.

No doubt many persons hesitate to subject their herds to this test for fear of exciting public suspicion; but it is no part of the Station's duty or intention to advertise the presence of this disease in any particular herd.

IS THE TUBERCULIN TEST INJURIOUS?

Others are probably deterred through fear of the test itself producing an injurious effect on the tested cattle; but on this point the evidence is conclusive that no such effect follows this test. At the Ohio Station eight cattle were subjected to the tuberculin test during the period from June, 1897, to April, 1899, the tests being repeated at intervals of a month during the latter part of this period. These cattle had all reacted to the tuberculin test at the beginning of the experiment, but as it progressed the reactions became more and more irregular and finally ceased altogether, notwithstanding a considerable increase in the dose of tuberculin. Some of these cattle were under three years old, others were cows and a bull of various ages. The young cattle kept fat and grew rapidly, the older ones constantly increased in weight, and when slaughtered the evidence presented indicated that if the tuberculin injections had had any effect upon the health of the animals it had been beneficial rather than otherwise. All the cattle at this Station are now tested regularly every six months, and animals which have been subjected to these tests for four years are still in the best of health. Altogether, this Station has made many hundred of tuberculin injections, with never a suspicion of any injurious effect. On the other hand, we have abundant encouragement to believe that we are building up a herd of healthy cattle, a large portion of which are the offspring of tuberculous parents.

At the Maine Station ten cattle received tuberculin injections at intervals of a few days to a few months from 1895 to 1897, as many as twenty-four injections being given in some cases. The results were similar to those reached at the Ohio Station.

At the New Jersey Station a herd of tuberculous cattle was kept under observation for six years, the animals receiving from eight to nineteen injections each during that period, but no evidence was found to justify the assertion that the general health, even of non-tuberculous cattle, had been affected, either for better or for worse, by the treatment.

Prof. H. W. Conn, of the Storrs Experiment Station of Connecticut, spent a year in Europe, making a special study of cattle tuberculosis and the tuberculin test. He reports that those who have had the largest experience in the use of this test say that there is absolutely no reason for believing that it is followed by any injurious results.

The Station's object in offering its services in this work is to assist farmers, breeders and dairymen in freeing their herds from a disease which, if permitted to continue unchecked, will inevitably cause great financial loss, as well as endanger the lives of those who may consume the milk produced

No. 223, March 18, 1901 ALFALFA

The correspondence of the Ohio Experiment Station indicates a large and increasing interest throughout the state in the culture of alfalfa. On the thin clays of the Station farm the results of the experiments thus far made with this plant have not been encouraging; but there are large areas within the state where heavy sheets of drift clay are found, which, when underdrained, should produce this crop to advantage. Again, there are other regions of well drained, black soils and rich, upland clays and bottom lands, which are naturally drained by underlying gravels; these offer conditions that have been found most favorable to alfalfa. Mr. Joseph E. Wing, of Mechanicsburg, Ohio, whose land is of the kind last mentioned, has grown alfalfa on a large scale and with excellent success, and he has furnished the following hints as to its culture:

"The best way to sow alfalfa is to plow the land deep in the spring or winter Turn up a little new soil; harrow down and sow beardless spring barley at the rate of two bushels to the acre. Sow fifteen pounds, or a peck, of alfalfa seed at the same time. I usually roll the land well after sowing. This makes the alfalfa do better but is sometimes hard on the barley. Alfalfa will come up through very firm soil and thrive better than when it is too loose. Let the barley ripen and cut it for grain. Then when the alfalfa starts up a little clip it with the mower. Clip it close. It will start again and after a month or so clip again. Keep the stock all off until next year It is better to keep stock off for two years. Begin mowing the second year as soon as blossoms form. After the first crop is taken off it will mature another in exactly thirty days. Do not delay cutting this second crop. It will take about thirty-five days for the second crop to grow. Take it off promptly Then in thirty-five or forty days there is the fourth crop. Take it, or graze it.

"The third year is the best in the alfalfa's life, though it may not decline for ten years. Keep all stock off it after frost; it is deadly then. Stock injures it greatly by treading on it after it is frozen. Do not pasture it close either in summer. It is the best pasture on earth for pigs, horses, cows, sheep and chickens, There is the same difficulty regarding bloat that there is in red clover. After frost there is perhaps more danger, yet the danger is slight if the stock, after being used to it, are never taken away from it until frost and are then taken away for good.

"There is a point of great importance in the growth of alfalfa, and it is responsible for half the failures; poor soil is responsible for most of the rest This point is the leaf blight, or rust. If alfalfa is left standing too long there comes on the leaves a reddish rust. This rust causes the leaves to fall. Then the stem becomes woody and the hay is of little value, and if it is not cut there will not be any growth of consequence. As soon, therefore, as this rust is seen, the alfalfa must be cut, and it must be cut no matter if it is a small growth. It will, as soon as it is cut, start to grow vigorously again. This rust will not form in less than about thirty days. That gives the alfalfa time to make a crop

*4 Ex Sta Bul 128.

"Another point. During a dry time the growth may be short. Cut it just the same when the time comes. It will then be ready to take advantage of a rain and make the next crop. If you have not cut it and the rain comes it will not grow The lesson is, cut it on time whether it is little or big.

"NOW FOR A FEW 'DON'TS'

"Don't sow alfalfa on poor soil.

"Don't sow alfalfa on wet soil.

"Don't forget to clip it three times the first year

"Don't turn any stock on it until the next May.

"Don't let alfalfa hay get dry before raking.

"Don't fail to cut your hay in time. That means to be ready to cut by June first.

"Don't ever let stock on your alfalfa meadows in cold weather

"Don't sow alfalfa seed on unprepared soil, as you do clover.

"If it fails with you, manure the land and try again."

No. 224, May 27, 1901: TREATMENT FOR THE CANKER WORM

It is now too late to begin treatment, this season, for the canker worm, on badly infested orchards, but there are many orchards in which the worms are not numerous where considerable future work might be saved by spraying at once The only way to combat this pest successfully is to begin spraying before the trees bloom, but in case it is just making its appearance in an orchard, late spraying may do considerable good, but the work must be done while the worm is still feeding. Orchards which are supposed to be free from the pest, but are near infested trees, ought to be watched carefully late in May and early in June, for when the worms destroy the foliage on trees where they are numerous they will travel along fences for considerable distances to other orchards.

Thorough spraying with some of the forms of arsenic recommended below will destroy the worms, but it should not be expected that one application will kill all. It may take several seasons' work to accomplish the desired result, but there can be no doubt but the pest may be held in check by using the means advised.

Inasmuch as Bordeaux mixture, which consists of four pounds each of lime and copper sulfate to a barrel of water, is needed for apple scab and other fungous diseases, the most economical plan is to spray with this mixture, adding sufficient poison to kill the worms. Half a pound of Paris green to a barrel of mixture will answer, provided the Paris green is pure. Three or four pounds per barrel of Disparene, a proprietary article stated to contain arsenate of lead, may be better for the reason given below. A cheaper form of arsenic is found in the arsenite of soda, which is made by taking two pounds of commercial white arsenic and four pounds of carbonate of soda to two gallons of water. To dissolve these materials they are boiled together for about fifteen minutes. Take one quart of solution to a barrel of Bordeaux. If it is desired to use poison alone, either arsenate of lead or Disparene is preferable, because neither injures the foliage. Arsenite of soda, if used alone, is very injurious to foliage and Paris green is quite likely to do harm, but either may be safely used in Bordeaux mixture. Two or three sprayings during the season are quite necessary to hold the canker worm in check, and even more to rid a badly infested orchard of the pest. As a rule, all that can reasonably be expected is to be able to hold it in check.

Disparene and arsenate of lead may be procured through druggists or through he publishers of the Ohio Farmer, Cleveland, O.

PUBLICATIONS OF THE OHIO EXPERIMENT STATION.

The first six annual reports of this Station, for the years 1882 to 1887, inclusive, contain the full record of its work during that period. Such bulletins as were published during these years ("First Series") were intended for newspaper use; they were afterward incorporated in the annuals and no copies of the bulletins can now be furnished. The first and second annual reports are also out of print.

The "Second Series" of bulletins began with 1888. The first seven of these were included in the seventh annual report, and cannot be furnished separately The bulletins published since 1888 are listed below.

No. 8 (Vol. II, No. 1, 1889)—Insects insecticides and methods of collecting and studying insects. *Out of print*

No. 9 (Vol. II, No. 2, 1889)—Colic of horses. *Out of print.*

No. 10 (Vol. II, No. 3, 1889)—Silos and ensilage Silage and field beets as food for cows *Out of print.*

No. 11 (Vol. II, No. 4, 1889)—Experiments with small fruits Effects of early and late picking upon keeping quality of apples. *Out of print.*

No. 12 (Vol. II, No. 5, 1889)—Wheat: Cultural and variety tests. *Out of print.*

No. 13 (Vol. II, No. 6, 1889)—Remedies for plum curculio and striped cucumber beetle Notes upon strawberry root-louse, grain plant-louse and little known injurious insects Prevention of potato rot. *Out of print.*

No. 14 (Vol. II, No. 7, 1889)—Cabbage and cauliflower, and treatment of certain plant diseases. *Out of print.*

No. 15 (Vol. II, No. 8, 1889)—Eighth annual report. Meteorological summary Index

No. 16 (Vol. III, No. 1, 1890)—Experiments with potatoes.

No. 17 (Vol. III, No. 2, 1890)—Field experiments with fertilizers.

No. 18 (Vol. III, No. 3, 1890)—Experiments with corn and oats. Actinomycosis.

No. 19 (Vol. III, No. 4, 1890)—Spraying to prevent insect injury Insects affecting corn Fungous diseases of plants. Collecting plants. *Out of print.*

No. 20 (Vol. III, No. 5, 1890)—Corn silage vs. sugar beets as food for milk production.

No. 21 (Vol. III, No. 6, 1890)—Wheat: Cultural and variety tests

No. 22 (Vol. III, No. 7, 1890)—Strawberries and raspberries.

No. 23 (Vol. III, No. 8, 1890)—The plum curculio, cucumber beetle, rhubarb curculio and clover stem borer. Potato blight.

No. 24 (Vol. III, No. 9, 1890)—Asparagus. Transplanting onions.

No. 25 (Vol. III, No. 10, 1890)—Grape rot and corn smut.

No. 26 (Vol. III, No. 11, 1800)—Ninth annual report. Meteorological summary. Index.

No. 27 (Vol. IV, No. 1, 1891)—Corn: Cultural, variety and fertilizer tests. *Out of print.*

No. 28 (Vol. IV, No. 2, 1891)—Miscellaneous experiments in the control of injurious insects *Out of print.*

No. 29 (Vol. IV, No. 3, 1891)—Fertilizers on wheat. *Out of print.*

No. 30 (Vol. IV, No. 4, 1891)—Wheat: Cultural and variety tests and treatment for smut *Out of print,*

No. 31 (Vol. IV, No. 5, 1891)—The wheat midge. *Out of print.*

No. 32 (Vol. IV, No. 6, 1891)—Experiments with small fruits. Diseases of the raspberry and blackberry. *Out of print.*

No. 33 (Vol. IV, No. 7, 1891)—The Hessian fly. *Out of print.*

No. 34 (Vol. IV, No. 8, 1891)—Forty years of wheat culture in Ohio. *Out of print.*

No. 35 (Vol. IV, No. 9, 1891)—Apple scab. The spraying of orchards. *Out of print.*

No. 36 (Vol. IV, No. 10, 1891)—Tenth annual report. Meteorological summary. Index. *Out of print.*

No. 37 (Vol. V, No. 1, 1892)—Oats: Cultural and variety tests

No. 38 (Vol. V, No. 2, 1892)—Mangel wurzels and sugar beets.

No. 39 (Vol. V, No, 3, 1892)—Fertilizers on corn and oats.

No. 40 (Vol. V, No. 4, 1892)—Insects which burrow in the stem of wheat

No. 41—Not published.

No. 42 (1892)—Wheat: Cultural and variety tests.

No. 43 (1892)—Greenhouses and greenhouse work. The food of the robin

No. 44 (1892)—The rusts of Ohio. Wild lettuce. Scab of wheat

No. 45 (1892)—Insects affecting the blackberry and raspberry.

No. 46 (1892)—Underground insect destroyers of the wheat plant
No. 47 (1892)—Eleventh annual report. Meteorological summary. Index
No. 48 (1893)—Profit in spraying orchards and vineyards *Out of print*
No. 49 (1893)—Field experiments with fertilizers
No. 50 (1893)—Experiments in feeding for milk.
No. 51 (1893)—Miscellaneous entomological papers
No. 52 (1893)—Twelfth annual report. Meteorological summary Index
No. 53 (1894)—Field experiments with commercial fertilizers
No. 54 (1894)—Strawberries. *Out of print*
No. 55 (1894)—The Russian Thistle in Ohio
No. 56 (1894)—The San Jose Scale
No 57 (1894)—Oats: Variety and cultural experiments
No. 58 (1894)—Thirteenth annual report. Meteorological summary. Index
No. 59 (1895)—Noxious weeds along thoroughfares and their destruction
No 60 (1895)—Feeding for beef.
No. 61 (1895)—Sub-irrigation in the greenhouse
No. 62 (1895)—The grape-root worm.
No. 63 (1895)—Orchard spraying and notes on varieties of raspberries
No. 64 (1895)—The smut of oats.
No. 65 (1895)—Variety trials with potatoes.
No. 66 (1895)—Fourteenth annual report. Meteorological summary. Index
No. 67 (1896)—Oats: Variety and cultural experiments; treatment for smut
No. 68 (1896)—Some destructive insects
No. 69 (1896)—The chinch bug
No. 70 (1896)—Forage crops.
No. 71 (1896)—The maintenance of fertility. Field experiments with fertilizers
No. 72 1896)—Peach Yellows, Black Knot and San Jose Scale.
No. 73 (1896)—Investigations of plant diseases in forcing house and garden
No 74 (1896)—Fifteenth annual report. Meteorological summary Index
No. 75 (1897)—Beet sugar production.
No. 76 (1897)—Potatoes. Cutural notes and variety and fertilizer tests
No. 77 (1897)—The chinch bug and other destructive insects
No. 78 (1897)—Corn: Cultural and variety tests. Corn smut
No. 79 (1897)—Some diseases of orchard and garden fruits.
No. 80 (1897)—The maintenance of fertility. Field experiments with fertilizers
No. 81 (1897)—The San Jose scale in Ohio.
No. 82 (1897)—Wheat: Cultural and variety tests
No. 83 (1897)—A first Ohio weed manual.
No. 84 (1897)—Sixteenth annual report. Meteorological summary Index
No. 85 (1897)—Strawberries: Cultural notes and variety tests
No. 86 (1897)—The story of the lives of a butterfly and a moth.
No. 87 (1897)—The Periodical Cicada, or so-called Seventeen-year Locust, in Ohio
No. 88 (1897)—Co-operative experiments made by the Ohio Agricultural Students' Union in 1896.
No. 89 (1897—Prevalent diseases of cucumbers, melons and tomatoes
No. 90 (1898)—Sugar beet investigations in 1897.
No. 91 (1898)—The lung and stomach worms of sheep.
No. 92 (1898)—Preliminary report upon diseases of the peach Experiments in spraying peach trees.
No. 93 (1898)—The home-mixing of fertilizers
No. 94 (1898)—The maintenance of fertility. Field experiments with fertilizers in 1897
No. 95 (1898)—Seventeenth annual report. Meteorological summary. Index.
No. 96 (1899)—The Army Worm and Other Insects; Wheat and Grass Sawflies; the Corn or Boll Worm; the Painted Hickory Borer; the Raspberry Cane Borer; the Peach Scale
No. 97 (1899)—Diseases of wheat and oats.
No. 98 (1899)—Small fruits: Cultural notes and comparison of varieties
No. 99 (1899)—Sugar beet investigations in 1898.
No. 100 (1899)—A comparison of factory-mixed and home-mixed fertilizers
No. 101 (1899)—Experiments with oats.
No. 102 (1899)—Soil and seed treatment and spray calendar for insect pests and plant diseases.
No. 103 (1899)—The San José Scale in Ohio
No. 104 (1899)—Further studies upon spraying trees and upon diseases of the peach
No. 105 (1899)—Further studies of cucumber, melon and tomato diseases
No. 106 (1899)—I. The chinch bug. II Experiments with insecticides.
No. 107 (1899)—The Hessian Fly.
No. 108 (1899)—Bovine Tuberculosis.
No 109 (1899)—Eighteenth annual report Meteorological summary Index.

No. 110 (1899)—The maintenance of fertility
No. 111 (1899)—Investigations of plant diseases
No. 112 (1899)—The Clover Root Borer.
No. 113 (1899)—Plums, comparison of varieties.
No. 114 (1899)—How insects are studied at the Ohio Agricultural Experiment Station
No. 115 (1900)—Sugar beets and sorghum: Investigations in 1899
No. 116 (1900)—The grape-cane Gall-maker and its enemies
No. 117 (1900)—Stomach worms in sheep.
No. 118 (1900)—Field experiments with wheat.
No. 119 (1900)—The Hessian Fly in 1899 and 1900
No. 120 (1900)—Nineteenth annual report. Meteorological summary Press bulletins Index
No. 121 (1900)—A condensed handbook of the diseases of cultivated plants in Ohio
No. 122 (1900)—Onion Smut—Preliminary experiments.
No. 123 (1901)—I. Grape rots in Ohio. II. Experiments in the prevention of grape rot
No. 124 (1901)—The maintenance of fertility: Field experiments with fertilizers on corn, oats and wheat in 1899 and 1900.
No. 125 (1901)—The maintenance of fertility. Field experiments on potatoes. 1894 to 1900
No. 126 (1901)—Sugar beet investigations in Ohio in 1900
No. 127 (1901)—Miscellaneous chemical analyses.
No. 128 (1901)—Twentieth annual report. Meteorological summary. Press bulletins

This Station has also published four bulletins in a "Technical Series," the first three numbers of which are devoted to entomological and botanical papers, the last to a list of the birds of Wayne county, Ohio

This page intentionally blank.

GENERAL INDEX

TO THE REPORTS AND BULLETINS OF THE OHIO AGRICULTURAL EXPERIMENT STATION, FROM ITS ORGANIZATION UNTIL JUNE 30, 1901.

(Not including the "Technical Series")

EXPLANATION.

The first six annual reports of this Station, for the years 1882 to 1887, inclusive, contain the full record of its work for that period. Such bulletins as were published during these years ("First Series") were intended for newspaper use only, and were afterwards incorporated in the annual reports. The "Second Series" of bulletins began with 1888. The first seven of these were incorporated in full in the seventh annual report. For 1889 and since the bulletins have been paged consecutively and have not been reprinted in the annual reports, but are attached to these reports as appendices, the annual reports being paged in Roman numerals. Consecutive numbering of bulletins began with No. 42, dated August, 1892.

Up to the end of the year 1896 the annual volumes cover calendar years, but after that year they cover the fiscal years ending June 30, this change being made at the request of the U. S. Department of Agriculture.

In the index which follows the figures in bold face type (**82, 83, 97-8, 98-9,** etc.), refer to the reports for the years 1882, 1883, etc., and the Roman numerals refer to pages in annual reports subsequent to 1888.

Acknowledgments: **83**, 7; **84**, 10; **85**, 8; **88**, 18; **89**, XXIII; **90**, XXVIII; **91**, XXIII; **92**, XXVII; **93**, XXIV; **94**, XVIII; **95**, XIX; **96**, XXI; **97**, XVII; **98**, XVII; **98-9**, XVI; **99-0**, XVIII; **00-1**, XIII.

Act establishing the Station: **82**, 19; **88**, 202.
relating to fertilizer control: **82**, 102.
authorizing removal of the Station **91**, V.
relating to black-knot and peach yellows; **95**, XXXVII.
relating to black-knot and peach yellows and San Jose scale: **96**, VII, XVI, XXXVIII, 218, **97**, XV; **99-0**, XXVII.

Actinomycosis: **90**, 107.

Aecidia, lists of; **92**, 138, 140.

Agricultural experiment, educational value of: **97**, XXXVII
investigations, relation of the State to: **97**, LXI.
Students' Union, experiments by: **98**, 69 (B. 88).

Agriculturist, report of: **88**, 20, **89**, XXV; **90**, XXXII; **91**, XXVI: **92**, XXXI; **93**, XXIX; **94**, XXII; **95**, XXVII; **96**, XXVIII.

Alfalfa: **92**, XXXII; **96**, 81; **00-1**, 12; 243.

Allen, Dr. E. W., address by: **97**, XLII.

Analyses, gratuitous: **96**, XVII.
of acid phosphate: **90**, 64; **00-1**, 203.
ashes, coal, corncob and wood: **00-1**, 207.
beets: **84**, 106, 212; **86**, 278; **92**, 22; **98-9**, 106; **99-0**, 177; **00-1**, 139, 239.

Analyses—(Continued.)
blackberries: **00-1**, 193.
bone meal: **87**, 268; **90**, 64; **00 1**, 205.
bone black: **00 1**, 202.
bran: **87**, 258; **00-1**, 188, 199, 210.
butter: **86**, 276.
carrots: **84**, 106, 212.
cheese: **85**, 235.
cherries: **00-1**, 194.
clays: **93**, XLI
clover stems: **87** 268.
corn: **84**, 106; **86**, 280.
corn fodder: **85**, 234; **00 1** 185, 186.
corn silage: **93**, 81; **00 1**, 180, 183.
corn products: **00-1**, 181.
cotton seed meal: **87**, 258; **00-1**, 210.
currants: **00 1**, 193.
distillery products: **00-1**, 182.
dried blood: **00-1**, 200.
fertilizers, mixed: **85**, 237; **87**, 267; **90**, 64; **00-1**, 199, 208. 209, 210.
floats: **00-1**, 204.
Florida soft phosphate: **00-1**, 204.
germ meal: **00-1**, 182.
gluten feed: **00 1**, 181.
gluten meal: **00-1**, 182.
gooseberries: **00 1**, 193.
grapes: **00 1**, 194, 195.
hay: **87**, 258; **00 1**, 187.
Jadoo fiber and liquid: **00-1**, 211.
lead arsenate: **00-1**, 197
limestone: **84**, 217; **98-9**, 120; **00-1**, 212, **213.**
linseed oil-meal: **85**; 235; **00-1**, 210.
manures: **84**, 219; **85**, 237; **86**, 280; **00-1**, **211.**
maple syrup: **87**, 264.
milk: **87**, 266.
mineral waters: **00-1**, 214, 216.
muck: **85**, 236; **86**, 281; **87**, 269.
muriate of potash: **00-1**, 205.
nitrate of soda: **00-1**, 201.
oat dust: **87**, 259.
oat hay: **85**, 235.
oat hulls: **86**, 279.
oat straw: **85**, 235.
Paris green: **00-1**, 197.
petroleum, crude: **00-1**, 198, 199.
potatoes: **84**: 106
raspberries: **87**: 262; **00 1**, 192.
slag phosphate: **00-1**, 203.
soils: **85**, 236; **99 0**, XII, 5.
soft phosphate: **96**, 179.
sorghum cane: **85**, 236.
strawberries: **00-1**, 191.
sugar beets: **84**, 106, 212; **86**, 279; **92**, 22; **98-9** 106; **99-0**, 177
00-1, 139.
sulphate of ammonia: **00-1**, 201.

Analyses—(Continued.)
starch refuse: **87**, 259.
strawberries: **87**, 259.
tankage, **00-1**; 206.
water: **84**, 215, 219; **85**, 236; **86**, 282; **93**, XL; **98-9**, 119; **00-1**, 213, 216.
wheat flour: **00-1**, 189.
wheat meal: **00-1**, 188.
Animal diseases, investigations of: **86**, 9.
husbandry, work in: **99-0**, XII.
Annual report, change in date of: **97**, XII.
Apple orchard, condition of: **83**, 146.
diseases of: See "Diseases of Plants."
insects affecting: See "Insects."
early and late picking of: **89**, 111.
Arsenical poisons injurious to foliage: **88**, 150.
Ashes as a fertilizer: **96**, 169; **98-9**, 138.
Asparagus, relative yield of male and female plants: **90**, XXV, 241.
see also "Diseases of Plants" and "Insects."
Attorney general on appointment of fruit commissons: **96**, XVI.

Bacillus anthracis, vitality of: **86**, 291.
Beans, garden, seed test of. **83**, 170, 180.
variety test of: **82**, 61.
see also "Diseases of Plants" and "Insects."
Bees poisoned by arsenical sprays: **96**, 48.
Beets, garden, variety test of: **84**, 131; **85**, 113; **87**, 222.
Beets, field, analyses of: **84**, 106, 212; **86**, 278; **92**, 22; **98-9**, 106; **99-0**, 177.
continuous culture of: **92**, 28.
cost of production: **90**, 163; **92**, 24; **93**, 65.
cultural experiments: **92**, 23; **97**, 23, 31.
manuring: **92**, 29.
transplanting: **92**, 25.
variety tests: **86** 133; **87**, 179; **92**, 17.
vs. corn silage, experiments in feeding: **93**, 51.
relative cost of: **93**, 65.
Beet sugar, announcement concerning: **00 1**, 239.
culture of in Ohio: **97**, 18: **98**, 123, (B. 90) **98 9**, 77 (B. 99); **99 0**, 175 (B. 115) **00 1**, 133 (B. 126).
cost of growing: **97**. 18; **98 9**, 117.
cultural notes: **90**, 161; **97**, 18; **98-9**, 78, 108; **00-1**, 165.
cooperative tests: **98**, 123; **98 9**, 77; **99-0**, 175; **00-1**, 133.
date of maturity: **98**. 162.
germination tests: **00-1**, 134.
how to secure better stand: **99 0**, 187.
results of investigation in 1900: **00 1**, 239.
subsoiling and early planting essential: **00-1**, 165.
variety tests: **97**, 24; **00-1**, 155.
seed distribution, 1901: **00-1**, 240.
see also "Analyses," "Diseases of Plants" and "Insects."
Beet sugar factories, cost of: **97**, 29; **98**, 159.
conditions pertaining to: **98-9**, 118.
industry, the farmer's side of the: **00-1**, 162.
in Ohio, the: **00-1**, 155.

Beet sugar factories—(Continued.)
manufacture: **97**, 8; **00-1**, 156.
analyses of water supply for: **98 9**, 119.
limestone for: **98 9**, 120.
growers guarantees of beet supplies for: **98**, 160.
production, history of: **97**, 2.
as affected by Ohio's climate: **98**, 153; **98-9**, 83; **99-0**, 177; **00-1**, 134.
world's consumption of: **97**, 4.
Biological laboratory, enlargement needed: **98 9**, XVI.
Biological survey: **90**, XXV.
Blackberries, variety tests: **83**, 148; **84**, 129; **85**, 111; **86**, 191; **87**, 257; **88**, 114; **89**, 107; **92**, XXXIII; **98-9** 73.
See also "Analyses," "Diseases of Plants" and "Insects."
Black-knot-yellows law: **95**, XXXVII; **96**, VII; XVI, XXXVIII, 218; **97**, XV; **99 0**, XXVII.
Blooming of plants, date of: **86**, 3 5; **87**, 289.
Board of Control, report of: **84**, 6; **85**, 6; **86**, 6; **87**, 7; **88**, 6; **90**, VII; **91**, V; **92**, VII; **93**, VII; **94**, VII; **95**, VII, **96**, VI; **98**, VI.
Bonds and banks, address on by C. V. Hard: **97**, LVIII.
Botanical department, work of: **98-9**, XV; **99 0**, XIII.
Botanical notes: **85**, 223; **86**, 304; **87**, 286; **98**, XVI.
Botanist, report of: **84**, 186; **89**, XXX; **90**, XXXVI; **91**, XXXIV; **92**, XXXIX; **94**, XL; **95**, XXXIV; **96**, XXXVII.
Bovine tuberculosis: **98-9** XI; 289; **00-1**, XII.
Boxwell, Hon. A., address by: **97**, LXI.
Brazilian flour corn: **96**, 96.
Breed tests: **93**, 77; **95**, XXIX; **96**, XXIX.
Brigham, Hon. J. H., address by: **97**, XXXIII, LV.
Buildings: **88**, 7; **92**, XVII; **97**, XII; XXIX
Bulbs, flowering, management of: **85**, 209.
Bulletins, publications of by the State: **89**, XVI; **90**, XVI.
Bushnell, Governor, A. S., address by: **97**, LI.
Butter, bogus, detecting: **85** 8, 227; **86**, 8, 269.
chemical analysis of: **86**, 276.
microscopical examination of: **86** 269.
Butter-fat and beef, relative cost of: **93**, 74.
Butterfly and moth, story of the lives of: **98**, 25.

Cabbage, cost of growing: **83**, 145.
seed, tests of: **83**, 174; **89** 185.
variety tests of: **84**, 132; **85**, 114; **86** 158; **87**, 211; **89**, 173.
see also "Diseases of Plants" and "Insects."
Canada pea, the: **96**, 87.
Carrots, variety tests of: **84**, 131; **85**, 121; **87**, 225.
Cattle, breed test of: **96**, XXIX.
experiments in feeding: **83**, 99; **85**, 88; **93**, 51: (B. 50) **94**, XXIII. **95**, XV, 7 (B. 60).
selection of: **94**, XXIII.
skin diseases of: **88**, 178.
soiling of: **85**, 95.
tuberculosis of: **98 9** XI, 289 (B. 108); **00-1** XII.
Cauliflower, variety test of: **89**, 183.
Celery, variety test of: **85**, 125.
See also "Diseases of Plants" and "Insects."

Cereal crops, work on: 99 0 XIII; 00-1, XI.
Chamberlain, Dr. W. I., address by: 97, XXXVII, LXIII.
Chemical department, work of: 98-9, XV; 99-0, XIV.
Chemical laboratory, description of: 96, XLI.
Chemist, report of: 84, 212; 85 227; 86, 269; 87, 258; 92, XL; 93, XXXVIII 94, XLIII; 95, XLIII; 96, XLI.
Chemistry of feeding: 95, 31.
relation of to agriculture: 84, 221.
Chicago breed test, the: 93, 77.
Clover, effect of in rotative cropping: 96, 157.
experiments with: 82, 95.
fertilizing value of hay: 97, 175.
loss of weight in curing: 82, 96.
residual effect of fertilizers on: 97, 147, 158.
see also "Diseases of Plants," "Fertilizers" and "Insects."
Clover seed, tests of: 83, 170, 180.
Colic of horses: 86, 296; 88, 178; 89, 21.
Conservatory, need of: 98 9, XVI
Cooperative experiments: 88, 11; 91, XV; 97-8, 69 (B. 88).
Cooperative work: 99-0, XIV.
Corn, annual yield of in Ohio: 96, 109.
classification of: 90, 76.
cooperative tests: 97, 85.
cross fertilization of: 82, 66; 83, 63; 85, 31.
curing and keeping: 85, 147.
date of planting: 84 71; 85, 35; 86, 117; 87, 138; 88, 77.
deep vs. shallow cultivation: 97, 60.
deep vs. shallow planting: 82, 42; 83, 73; 84, 69; 85, 35: 86, 117; 87, 138; 90, 84.
deep vs. shallow plowing for: 97, 54.
descriptive notes on varieties: 86, 111.
detasseling: 97, 63.
effect of rainfall and temperature on: 88, 82.
for ensilage, varieties of: 90, 93; 91, 24.
as a forage crop: 96, 96.
grain and cob in the bushel: 86, 88; 97, 84.
and stover, proportion of: 86, 108; 96, 110.
germination tests: 83, 149, 85, 136, 148; 86, 239.
hybrid, a new: 82, 68.
improvement of seed: 82, 68.
methods of culture: 83, 79; 84, 75; 85, 42; 86, 127; 87, 161; 88, 86, 87; 90, 91; 91, 20; 97, 60.
methods of harvesting: 91, 21; 97, 66.
seed from butts, tips and middles: 83, 149; 86, 126; 88, 85; 90, 90; 91, 18; 97, 57.
shrinkage in drying: 88, 72.
statistics of production: 82, 49; 86; 132.
sweet, variety tests of: 82 61; 84, 139; 85, 123, 152; 86, 178; 87, 243.
thick and thin planting: 82, 43; 83, 65; 84, 73; 85, 38; 86, 121; 87, 154; 88, 83; 90, 89; 91, 17; 97, 54.
variety tests: 82, 21, 38; 83, 53; 84, 64; 85, 19, 31; 86, 83; 87, 114; 88, 69; 90, 77; 91, 3; 92, XXXI; 97, 72.
weather conditions affecting experiments: 97, 56.
see also "Analyses," "Diseases of Plants," "Fertilizers" and "Insects."

Corn silage v. dry cured fodder corn: **90,** 171; **95,** 18.
sugar beets: **90,** XXII; 153; **93,** 51.
relative cost of: **93,** 65.
see also "Analyses."
Correspondence: **83,** 6; **84,** 10; **85,** 7, 244.
Cowpea, the: **96,** 84.
Cucurbits, list of varieties grown: **98-9** 220.
Currants, variety tests: **83,** 148; **84;** 129.
see also "Analyses," "Diseases of Plants" and "Insects."
Creamery, the: **95,** XXIX.
Crimson clover: **96,** 90
Crops of the farm: **93,** XXXII; **94,** XXV; **95,** XXX; **96,** XXX.
Crops of Ohio, annual yield of: **96,** 109.

Dairy husbandry, work in: **83,** 8; **92,** XXXII; **94,** XXIII; **95,** XXIX.
Dairy tests, state: **92,** XX
Dairyman, appointment of: **94,** VIII.
Dedication of main building: **97,** XXX.
Dehorning experiments: **95,** XXVIII.
Department of Agriculture, history and functions of: **97,** XLVIII.
Department of Agriculture and the experiment station: **97,** LV.
Digestibility of foods: **95,** 35.
Director, report of: **82,** 5; **83,** 5; **84** 7; **85,** 7; **86,** 8; **87,** 9; **88,** 7; **89,** XIV; **90,** XIII; **91,** XIV, **92,** XVI; **93,** XVI **94,** XIII; **95,** XIII; **96,** XI; **97,** XII; **98** XIII; **98-9,** XI; **99-0,** XI; **00-1,** XI.
Diseases of animals, investigation of: **86,** 9.
actinomycosis, **90,** 107.
Bacillus anthracis, vitality of: **86,** 291.
bovine tuberculosis: **98-9,** XI; 289.
literature of: **98-9,** 371.
municipal inspection against: **98 9,** 333.
outbreak of: **98-9,** 295.
prevalence of: **98-9,** 324.
prevalence in Ohio: **98 9,** 330.
state control of: **98-9,** XIII, 369; **00-1.** XII.
colic of horses: **86** 296; **88,** 178 **89,** 21.
gastro-enteritis in lambs: **98,** 166.
grub in the head: **98,** 178.
hairworm of sheep: **98,** 168.
lombriz of sheep: **98,** 165.
lumpy jaw: **90,** XXI, 107.
lung and stomach worms of sheep: **86,** 293; **98,** XV; 163 (B. 91); **98 9,** XIII; **99 0,** XII. 199, 265.
swine plague: **86,** 283: **88,** 178.
threadworms of sheep: **98,** 167.
tuberculosis in swine: **98 9,** 323.
Diseases of plants: general discussion: **90,** XXII; 139; **95,** XXXIX; **00-1, 1,**
alfalfa, leaf spot fungus: **00 1.** 12
apple, bitter rot or anthracnose: **97,** 66. 134; **00 1. 12.**
blight: **97,** 135.
brown spots: **97,** 135.
canker: **00-1,** 14.
crown gall: **97,** 139; **00-1, 13.**

Diseases of apple—(Continued.)
fly-speck fungus: **97**, 133; **00 1**, 13.
root rot: **00 1**, 15.
scab: 89, 188; **90**, 142; **91**, 187, 193; **95**, XXIV, **96**, XV, XXVI; **97**, 129, 131; **00-1**, 15, 66.
sooty-fungus: **96**, XXVI; **97**, 133; **00** 1, 13, 66.
sun scald: **97** 135; **00-1**, 14.
twig blight: **00-1**, 15.
asparagus, rust: **00-1**, 16.
barberry, rust: **00-1**, 17.
Barley, rust: **00-1** 17.
smuts: **95**, XXXVIII; **00-1**, **17.**
bean, anthracnose: **00-1**, 17.
bacterial blight: **00-1**, 18.
mildew: **00-1**, 18.
rust: **00-1**, 19.
beet; leaf-spot: **98 9**, 121; **00-1**, 18
begonia; nematodes: **00-1**, 18.
blackberry; anthracnose: **91**, 124; **97**, 102; **00-1**, **19.**
crown gall: **00-1**, 19.
leaf-spot: **97**, 107.
rust: **91**, 127; **97**, 107; **00-1**, 19.
blue grass; mildew, smut and rust: **00-1**, 19.
broom corn; smut: **00 1** 19.
buckwheat; leaf blight: **00-1**, 20.
cabbage—cauliflower, brown rot, club root, downy mildew, leaf blight, white rust: **00 1**, 20.
calla; root rot: **00-1**, 21.
carnation; bacteriosis, leaf and calyx mold, rust and stem or root rot: **00-1**, 22
carrot; leaf-spot: **00-1**, 22.
catalpa; leaf-spot and mildew: **00-1**, 24.
cedar; cedar apples or cedar rust: **00-1**, 23.
celery; black root: **00 1**, 23.
heart rot: **96**, XXXVIII: **00-1**, 24.
leaf-spot, or blight: **96**, XXXVIII; **00-1**, 23.
rust: **00-1**, 24.
cherry; black knot: **96**, 208; **97**, 113; **99-0**, 274; **00-1**, **25.**
brown rot: **89**, 188; **97**, 113; **00-1**, 25.
leaf-spot: **97**, 122; **00-1**, 25.
mildew: **90**, 143; **97**, 124; **00-1**, 25.
chestnut; anthracnose: **00-1**, 26.
chrysanthemum; leaf-spot and rust: **00-1**, 26.
clover; dodder and rust: **00-1**, 26.
corn; bacterial disease, leaf blight and rust: **00 1** 27.
smut: **90**, XXV; 264; **95**, XXXIX; **97** 92; **00 1**, 28.
crab-apple; scab: **00 1**, 28.
cucumber; anthracnose: **98**, 109; **98-9**, 221, 222; **99 0**, 140; **00 1**, 28.
downy mildew: **96**, 234; **98**, 103; **98 9**, 219, 235; **99 0**, 139; **00 1**, 29.
leaf-spot or blight: **96**, 235; **98 9**, 222; **99 0**, 139; **00-1**, 30.
powdery mildew: **00 1**, 30.
nematodes: **96**, 235; **99 0**, 139; **00 1**, 31.
scab or fruit spot: **99 0**, 139; **00-1**, 30.

Diseases of cucumber—(Continued.)
wilt or bacterial blight: **96**, 233; **98-9**, 221; **00-1**, 30.
currant; dropsy: **00 1**, 31.
leaf spot: **97**, 99; **00-1**, 31.
mildew: **00-1**, 31.
dewberry; leaf spot and rust: **00-1**, 32.
egg-plant; anthracnose, etc: **00-1**, 32.
elm; leaf disease and mildew: **00-1**, 32.
flax; dodder: **00-1**, 33.
gladiolus; scab and rot: **95**, XXXIX.
gooseberry; leaf spot: **97**, 100; **00 1**, 33.
mildew: **95** 106; **97**, 101; **00-1**, 33.
gourd; anthracnose, downy mildew, etc: **00 1**, 33.
grape; anthracnose: **00-1**, 34.
bitter rot: **00-1**, 34.
black rot: **89**, 186; **00-1**, 34.
canker or winter injury: **00 1**, 36.
crown gall: **00 1**, 36.
downy mildew or brown rot: **90**, XXV; 253, **00-1**, 35.
powdery mildew: **00-1**, 35.
white rot: **00-1**, 35.
grasses, See blue grass and timothy.
hollyhock, anthracnose, leaf-blight and rust: **00 1**, 36.
horse-chestnut, leaf-spot: **00-1**, 37.
horseradish, leaf-blight, leaf-spot, white mold: **00-1**, 37.
lettuce, anthracnose or leaf perforation: **96**, 222; **99-0**, 139; **00-1**, 37.
downy mildew: **96**, 226; **99-0**, 139; **00**-1, 37.
drop or rot: **96**, 221; **99-0**, 139; **00 1**, 37.
maple, anthracnose and leaf-spot: **00**-1, 38
millet, leaf-spot and smut: **00 1**, 28.
muskmelon, anthracnose: **98-9**, 229.
downy mildew: **98-9**, 230; **00-1**,38.
leaf-blight: **96**, XXXVII, 235; **98**, 117; **98-9**, 230; **00-1**, 39
wilt: **00**-1, 39.
mustard, club-root: **00-1**, 40.
oats, bacterial disease: **00-1**, 40.
rust: **00-1**, 41.
smut: **86** 80; **88**, 63; **92**, 17; **95**, XVII, 115 (B. 64.); **96**, 2; **98-9**, 49, 179; **99-0**, 141; **00 1**, 41.
oat-grass, smut: **00-1**, 41.
onion, blight and downy mildew: **00 1**, 41.
smut: **96**, XXXVIII: **00-1**, 42.
pea, blight, leaf-spot, powdery mildew, sun-scald: **00-1**, 42.
peach, anthracnose: **98**, 225.
brown or pustular spot: **98**, 222: **00 1**, 44.
constriction disease: **98**, 233.
crown gall: **95**, XXXV; **98**, 208, 212, **00-1**, 43.
dropsical swellings of twigs and branches: **98**, 206.
fruit spot: **95**, XXXIV.
June drop: **00**-1, 43.
premature ripening: **98**, 193, 194.
gum flow on twigs: **97**, 121; **98**, 199; **00-1**, 45.

Diseases of peach—(Continued.)
gummosis of fruit: **98**, 206.
leaf curl: **95**, XXXIV; **98**, 226; **98-9**, 201; (B. 104) **99-0**. 128; **00 1**. 44.
leaf-spot: **98**, 231; **00-1**, 44.
little peach: **00-1**, 43.
mildew: **98**, 225.
nematode galls: **98**, 225
pustular spot: **98**, 245; **99-0**, 136; **00 1**, 44.
root rot: **98**, 235; **00-1**, 45.
rosette: **98**, 199.
rot: **98** 218; **00-1**, 45.
scab: **98**, 220; **99-0**. 136; **00 1**, 45.
stem gall: **98**, 213.
stem and root tumors: **98**, 208.
twig spots: **98**, 208, 234.
twig blight: **98**. 234.
winter injury: **98**, 187; **00-1**, 46.
yellows: **95**, XXXV; **96**, 193; **98**, 193; **98-9**, 212; **99-0**, 274; **00-1**, 47.
pear, blight: **90**, 143; **97**, 125; **00-1**, 47.
crown gall: **97**, 127.
leaf-spot: **97**, 126; **00 1**, 48.
scab: **97**, 126; **00 1**, 48.
sun scald or trunk blight: **00 1**, **48**.
plum, black knot: **97**, 118; **00-1**, 48.
crown gall: **00-1**, 48.
fruit rot: **89** 140; **90**, 143; **97**, 113; **00-1**, 49.
gummosis: **97**, 121.
mildew: **97** 124.
pockets: **97**, 117.
scab: **97**, 118.
shot-hole fungus, **97**, 122; **99 0**, 117; **00 1**, 49.
twig disease with gum flow: **97**, 121.
winter injury or sun scald: **00 1**. 49.
potato, blight: **90**, XVIII, 142, 239; **92**, XXXV; **97**, 37; **00-1**, 50.
rot: **89**, 157; **98**. 97; **00-1**. 51.
scab: **92**, XXXV; **96**. XXV; **97**, 36; **98**, 92; **00-1**, 51.
pumpkin, mildew and wilt: **00-1**. 51.
prickly lettuce, disease of: **92**, XXXIX.
quince, blight: **97**, 125; **00-1**, 51
leaf-spot: **89**, 187; **97**, 126; **00-1**, 51.
rots and rust: **97**, 127; **00-1**, 51.
raspberry, anthracnose: **91**, 119, 124; **97**, 102; **99 0**, 116; **00-1**, 52.
bacterial disease of: **91**, 128; **97**, 108; **00-1** 52.
crown gall: **97**, 108; **00-1**, 52.
leaf-spot: **97**, 107; **00-1**, 53.
rust: **97**, 107.
rose, leaf blotch, mildew, nematodes and rust: **00-1**, 53.
rye, ergot, rust and smut: **00-1**, 54.
sorghum, blight and smut: **00-1**, 54.
spinach, anthracnose, mildew, scab and smut: **00-1**, 54.
squash, see cucumber.
strawberry, leaf spot or rust: **00 1**, 55.
sugar beet, bacterial disease: **00-1**, 172.

Diseases of sugar beet—(Continued.)
crown gall: **00-1** 171.
heart rot or dry rot: **00-1**, 170.
leaf spot: **00-1**, 55, 172.
rust and mildew: **00 1**, 173.
scab: **00 1**, 55, 171.
sweet potato, white mold and rot: **00 1**, 56.
sycamore, anthracnose: **00 1**: 56.
tomato, anthracnose: **96**, XXXVII, 242; **00-1**, 56.
blight: **96** XXXVII, 242; **98 9**, 232; **00-1**, 56.
black rot: **96**, 242.
fusarium: **96**, 242.
leaf blight: **96**, XXXVII, 241; **00-1**, 57.
leaf mold: **96**, 237; **00**-1, 57.
nematodes: **00-1**, 57.
point rot: **96**, 241; **00 1**, 57.
turnip, club-root: **00-1**, 58.
verbena, mildew: **00-1**, 58.
violet, leaf-spot, leaf-blight and nematodes: **00**-1 58.
watermelon, anthracnose, leaf-blight, leaf-spot and mildew: **98-9**, 232; **00-1**, 58.
wheat, rust: **98-9**, 38, 40; **00-1**, 58.
scab: **91**, 92; **92**, 93, 147; **98-9**, 40; **00-1**, 59.
smut: **90**, XXIII, 205; **91**, 84; **92**, 93; **95**, XXXVIII; **97**, 232; **00**-1, 59.

Eau celeste: **90**, 141.
Elevations above sea level in Ohio: **97**, 38.
Ellis, Hon. S. H., address by: **97**, XXX.
English sparrows and plant lice: **89**, 152.
Ensilage and silos: **89**, 73.
crops: **89**, 80.
corn: comparison of varieties: **89**, 86.
Entomologist, announcement of: **92**, 84.
report of: **88**, 128; **89**, XXX; **90**; XXXVI; **91**, XXXII; **92**, XXXVI; **93**, XXXV; **94**, XXIX; **95**, XXXII
Entomology, work in: **98-9**, XIV; **99 0**, XIII.
Experiment, agricultural, meaning of: **82**, 7.
educational value of, **97**, XXXVII.
scientific and practical, difference between: **82**, 7.
Experiment Station and Congress, the: **97** LXIV.
and the farmer, the: **97**, LXIII.
evolution of, the: **97**, XLII.
Experiment Stations and Department of Agriculture: **97**, LV.
establishment of in Europe: **82**, 14; **97**, XLV.
establishment of in America: **82**, 16; **97**, XLVI., LXV.
income of: **97**, XLVI, LXVI.
number of: **97**, XLVI.
permanency of: **97**, L.
ways in which they help the farmer: **97**, XLIX.

Farm, the Station: **90**, XIII.
Farmers' institutes: **89**, XXI; **90** XXVIII; **92**, XX.
Farm products: **93**, XXXI; **94**, XXV; **95**, XXX; **96**, XXX.

Farm tests: **89**, XV.
Fattening cattle: see "Feeding for beef"
effect of temperature on: **95**, 20.
finishing on grass: **95**, 21.
increase at different periods: **95**, 25.
Feeding for beef: **93**, 74; **95**, XV, 7.
calculation of rations in: **95** 38.
chemistry of cattle feeding: **95**, 31.
cost of increase in: **95**, 10.
possibilities in: **95**, 26.
Feeding corn meal vs. wheat meal: **95**, 15.
corn silage vs. corn stover: **95**, 17.
oil meal vs. gluten meal: **95**, 16.
heavy vs. light: **95**, 20.
on grass to finish: **95**, 21, 24.
in warm barn vs. in open shed, **95**, 24.
Feeding standards: **95**, 40.
Feeding stuffs, analyses of: **85**, 234; **95**, 48, **00-1**, 177, 188, 189, 210.
nutritive value of: **95**, 43.
manurial value of: **95**, 44.
Feeding for milk: **83**, 99; **85**, 88, 95; **93**, 51.
corn silage vs. field beets as food in: **93**, 51.
effect of advance in lactation upon productivity of food: **93**, 76.
effect of age of cow on productivity of food: **93**, 76.
effect of ratio of nutriments in food: **93**, 67.
fluctuations of live weight in: **93**, 61.
possible improvements in milk production: **93**, 79.
the productive capacity of different cows: **93**, 68.
ratio between increase of live weight and production of butter fat: **93**, 74.
ratio of dry matter in food to yield of milk: **93**, 61.
Feeding pigs on carrots; **83**, 132; **84**, 101.
on corn cooked and raw: **87**, 189.
on corn ground and unground: **87**, 181, 189.
on corn and green foods: **85**, 80.
on milk and pea meal: **86**, 134.
on potatoes: **84**, 101.
with and without shelter: **83**, 132.
Fertility: See "Maintenance of fertility."
Fertilizer trade, the: **98**, 277.
Fertilizers, acidulation of: **98**, 275; **98 9**, 140.
analyses of: **85**, 237; **87**, 267; **90**, 64; **00-1**, 199, 208, 209, 210.
box experiments with: **90**, 56.
chemistry of: **98**, 269.
carrying nitrogen and phosphoric acid, comparison of: **96**, 163; **99 0**, 63.
complete, comparison with acid phosphate: **00-1**, 114.
composition of materials used in: **98 9**, 139.
cooperative tests with: **90**, 30, 53; **91**, 32, 62; **92**, 40; **93**, 26, 39; **94**, 21; **96**, 144.
constituents of, found in average crops: **96**, 109, 154; **99-0**, 56.
found in soils: **00 1**, 110.
recovered in increase of crop: **96**, 159; **99-0**, 55.
cost of constituents in mixed fertilizers: **96**, 110
cost of producing crops by chemicals: **99-0**, 60.

Fertilizers—(Continued.)
effect of on germination: **96**, 181.
on ratio of straw or stover to grain: **99 0**, 45.
separate constituents: **91**, 75; **96**, 152.
field experiments on corn grown continuously: **82**, 46; **83**, 81; **84**, 78; **85**, 44; **86**, 129; **87**, 167; **88**, 88, 95; **90**, 27; **91**, 25; **92**, 35; **93**, 34; **94**, 13; **96**, 143, 149; **97**, 166; **99-0**, 30; **00 1**, 116.
on corn grown in rotation: **93**, 38; **94**, 18; **96**, 119, 128; **97**, 143; **98**, 291, 300: **98 9**, 127; **99-0**, 14; **00-1**, 106
on oats grown continuously: 88 66; **90**, 48; **92**, 52; **93**, 31; **94**, 10; **96**, 142, 149; **97**, 170; **99 0**, 35; **00-1**, 116.
on oats grown in rotation; **96**, 121, 128; **97**, 143; **98**, 300; **99-0**, 14; **00 1**, 106
on onions: **85**, 126.
on potatoes: **82** 52; **83**, 98; **84**, 95; **85**, 74; **86**, 155; **87**, 208; **90**, XVIII, 11; **95**, 154; **96**, XXV, 131; **97**, 158; **98**, 313; **99 0**, 22; **00-1**, 121.
on strawberries: **88**, 108; **94**, 36: **96**, XXVI; **98**, 5.
on wheat grown continuously: **83**, 35· **84**, 43; **86**, 39; **87**, 53; **89**, 119; **90**, 49; **91**, 57; **93**, 17; **94**, 3; **96**, 140, 148; **99 0** 38; **97**, 172.
on wheat following corn: **98 9**, 128; **99 0**, 53, 146, 156.
on wheat following oats: **91**, 68; **96**, 123, 128; **97**, 143; **98**, 300; **99 0**, 14; **00-1**, 106; 237.
on wheat following potatoes: **96**, 135; **97**, 158; **98**, 313; **99 0**, 22; **00-1**, 127.
on hay crops following wheat: **91**, 70; **94**, 20; **96**, 125, 128; **97**, 143; **99 0**, 14.
on sandy soil: **96**, 138; **00-1**, 128.
Fertilizers on greenhouse crops: **92**, XXIV, 100.
home mixing of: **96**, 170; **98**, 269 (B. 93); **98-9**, 123 (**B. 100**).
" formulæ for: **96**, 174; **98 9**, 125, 146.
" how to calculate constituents: **98-9**, 140.
" how to mix: **98 9**, 143.
" materials for: **98**, 270; **98 9**, 133.
" objections to: **96**, 171; **98**, 279.
" saving by: **96**, 176; **98**, 278; **98 9**, 150.
manufacture of: **98**, 274.
"Natural plant food": **96**, 178.
nitrogen carriers, comparison of: **96**, 163; **98**, 319; **99-0**, 63.
nitrogen ratio, effect of: **99-0**, 61.
partial vs. complete, comparison of: **98-9**, 129.
phosphoric acid carriers, comparison of: **96**, 164: **98**, 319; **99-0**, 65.
pot experiments with: **85**, 231; **90**, 56.
quantity required to produce a bushel of increase: **91**, 62
questions concerning, requiring investigation: **96**, 112.
recovery of constituents of in increase of crop: **96**, 159; **99-0**, 55.
residual effect of: **96**, 157.
Rothamsted experiments with: **90**, 49; **91**, 64; **96**, 159.
soft phosphate: **96**, 178.

Fertilizers—(Continued.)
soil analysis not sufficient guide to use of: **90**, 19.
soils used in field experiments: **99 0** 4
sources and cost of: **90**, 62; **91**, 71; **94**, 31; **96**, 164; **98**, 278.
substations for experiments with: **96**, 114.
tankage, acidulation of: **98**, 276.
the trade in: **98**, 277.
valuation of: **90**, 72; **98**, 287.
Woburn experiments with: **90**, 50.
Fraud, warning against: **00-1**, 235.

Gardening, ornamental, report on: **85**, 207.
window: **85**, 207.
Garden vegetables: **83**, 137; **84**, 130; **85**, 112; **86**, 157; **92**, XXXIV.
Gasoline treatment for stomach worms in sheep: **98**, 174; **98 9**, XIII; **99 0**, **XII**, 207, 263.
Gastro enteritis in lambs: **98**, 166, 175.
Gooseberries, variety tests of: **83**, 148; **84**, 129; **89**, 109; **92**, XXXIV; **98-9**, **74**.
" See also "Analyses," "Diseases of Plants" and "Insects."
Grapes, variety tests: **83**, 147.
" See also "Analyses," Diseases of Plants" and "Insects."
Grasses, descriptive notes on: **84**, 171; **85**, 219.
experiments with: **82**, 21, 95.
for lawn: **84**, 179.
see also "Diseases of Plants."
Greenhouse: calendar of operations in: **92**, 105.
crops suitable for; **92** XXV, 103.
fertilizers in: **92**, XXIV, 100.
lettuce in: **92**, XXV, 108.
plans of: **92**, XVIII; **95**, 57.
subirrigation in: **92**, XXIV, 101; **95**, **57**.
tomatoes in: **92**, XXV, 106.
water bench in: **92**, XXIV, 102.

Hair worms of sheep: **98**, 168.
Hard, Col. C. V., address by: **97**, LVIII.
Hay, loss of weight in curing: **82**, 96
see also "Analyses" and "Fertilizers."
Hedges, evergreen: **86**, 259.
report on: **86**, 259
History and work of the Station: **97**, XXVII, XXXIII.
Horses, colic of: **86**, 296; **88**, 178.
Horticultural work of the Station: **97**, XIV; **98**, XV; **98-9**, XIV; **99-0**, **XIII**, **00-1**, XI.
Horticulturist, announcement of: **88**, 101.
report of: **84**, 107; **85**, 98 **86**, 146; **87**, 194: **88**, 100; **89**, XXVIII; **90**, XXXIV; **91**, XXIX; **92**, XXXIII; **93**, XXXIII; **94**; XXVI; **95**, XXIV; **96**, XXV.
House plants, hints on management of: **85**, 207.
Hyacinth, culture of: **85**, 210.
Hydrocyanic acid gas, how made: **98 9**, 195.

Improvements made: **92**, IX; **95**, XXX.
Inspection of meat and milk: **98-9**, 333.
nurseries: **98**, VII; **98 9**, XI, 193; **99 0**, **XI**.

Insectary, plan of: **92**, XX.
Insect control: **97**, XIV.
enemies of house plants: **85**, 208.
foes of American cereals: **93**, 130.
Immigrants in Ohio: **93**, 118.
record: **88**, 131; **89**, XLVII; **90**, LIII.
Insecticide machines: **86**, 198, **89**, 11
Insecticides and their application: **89**, 8; **90**, 123; **92**, XXXIV; **98 9**, 248 (B. 106)
combining with fungicides: **89**, 186; **90**, 143.
arsenic, white: **89**, 9.
arsenical: **84**, 153; **86**, 194.
benzine: **89**, 10.
bisulphide of carbon: **89**, 10, 144; **95**, 89; **98 9**, 252.
carbolic acid: **89**, 10, 144.
coal soot: **89**, 144.
coal tar; **89**, 10.
copper arsenic solution: **92**, XXXIV.
gas lime: **89**, 111.
gasoline: **89**, 10.
gypsum: **89**, 145.
hellebore: **82**, 74; **84**, 153; **86**, 195; **89**, 9, 153, 156, **90**, 124; **95**, 105.
kainit: **98-9**, 248.
kerosene: **89**, 144.
kerosene emulsion: **84**, 154; **86**, 196; **89**, 10, 152; **90**, 125;
lime and plaster: **89**, 10.
London purple: **89**, 9, 156, 158; **90**, 124; **95**, 105.
manure: **89**, 143.
paraffine oil: **89**, 11.
Paris green: **89**, 8; **90**, 124; **95**, 105.
peroxide of silicates: **89**, 145.
phenyl, soluble: **89**, 11.
pyrethrum: **84**, 154; **86**, 195; **89**, 9, 145, 155, 156, **90**, 124.
saltpetre: **89**, 145.
slug shot: **89**, 145.
soaps: **86**, 197.
tobacco: **89**, 156; **91**, 46; **98 9**, 251.
whale oil soap: **89**, 156, **98 9**, 186, 251.

Insects affecting the apple: **89**, 3
blackberry: **92**, XXVI, 151.
cabbage: **91**, 47.
clover: **89**, L, 7.
corn: **90**, XXI, 133.
currant and gooseberry: **89**, 6.
plum and cherry: **89**, 4.
raspberry: **89**, 5; **92**, XXVI, 151.
squash and melons: **89**, 6.
wheat: **86**, 222; **92**, XXIII, XXVI.
apparatus for collecting and preserving: **89**, 15.
books relating to: **89**, 19.
causes of ravages of: **82**, 71.
classification of: **82**, 72.
directions for sending: **82**, 118; **86**, 193.
fall measures against: **99 0**, 266.

Insects—(Continued.)
how studied: **99 0**, 165 (B. 114).
life stages of: **82**, 72.
Insects, notes on: American fruit fly: **92**, 81, 82.
meromyza: **86**, 223.
raspberry beetle: **92**, 189.
anthomyian flies: **82**, 76.
ants, trapping: **84**, 155.
white. **96**, XXXV, 42, 55
aphides, experiments on: **98-9**, 254.
aphis on house plants: **84**, 152
peach: **95**, XXXIII, XXXIV.
wooly of the apple: **98-9**, 254.
apple leaf hopper: **88**, 152; **89**, LIII, 154.
maggot: **90**, LXIV.
plant louse: **93**, 111, 112, 117, 143.
worm: **89**, 3.
apple-tree borers: **82** 87, 88; **83**, 199; **84**, 151, 155, **86**, 209; **89**, 4.
army worm: **85**, 191; **96** XXXIII, **98 9**, 3 (B 96)
asparagus beetle: **82**, 80, **93** 85, 88, 142, **96**, XXXIV.
bag or basket worm: **93**, 102, 107, 117, 142; **94**, XXXII; **95**, XXXII; **96**, XXXIV.
bark lice of the apple and pear: **90**, 127, LVIII.
bean weevil: **82**, 80; **88**, 163; **89**, LII.
black army worm: **93**, 175.
blackberry crown borer: **92**, 159.
flea louse: **92**, 209.
gall: **92**, 156.
leaf miner: **92**, 152, 186.
midge: **92**, 188.
stem gall midge. **92**, 187.
blister beetles: **93**, 99, 142; **98-9**, 122.
blood-red lady-bird: **89**, 170.
bot fly: **90**, XXII, 136.
bronze cut worm: **86**, 219.
bud moth: **92**, 182.
buffalo tree hopper: **90**, LVIII, 130.
butterfly and moth, stories of lives of: **98**, 25 (B 86).
swallow tail: **98**, 26.
cabbage aphis: **90**, LX, **92**, XXXVII; **93**, 109, 142.
butterfly: **82**, 82.
curculio: **97**, 50.
cut worms: **91**, 51.
plusia: **86**, 214; **88**, 160; **91**, 49.
worm, imported: **83**, 196, 201; **84**, 152, 155; **85**, 189; **86**, 215; **90**, LX; **91**, 47; **96**, 31.
disease of: **89**, LIII.
canker worm: **82**, 90; **83**, 199; **85**, 187; **86**, 204; **88**, 132; **89**, 3; **96**; XXXIII; 21, 54; **99 0**, 273; **00-1**, 244.
cecropia emperor moth: **86**, 206; **92**, 170; **98**, 29.
celery worm: **88**, 162.
chain dotted geometer: **92**, 179.
cherry aphis: **92**, XXXVII.
cherry tree slug: **89**, LII, 156.

Insects, notes on—(Continued.)
chinch bug: 88, 131, 164; 89, XLIX; 90, LIX; 93, 135; 94, XXXIII; 95, XXXII; 96, XXXII, 59; 97*, 33 (B. 77); 98-9, 237 (B. 106); 99-0, 296, 00 1, 233.
disease of; 88, 165; 96, 66, 76; 00-1, 234.
distribution of: 96, 59; 98 9, 242.
clover hay worm: 88, 134; 91, 54.
leaf weevil: 92, XXXVIII; 94, XXXVI, XXXVIII; 96, 27, 54.
root borer: 88, 133; 89 7; 91, 53; 94, XXXVI; 96, 31, 55, 99-0, 143 (B. 112).
seed midge: 86, 218; 88, 133; 89, 7; 91, 54; 97, 46*.
stem borer: 90, XXIV, 235.
codling worm: 82, 85; 83, 199; 84, 152, 155; 86, 208; 89, LI, 3; 90, LIX
comma butterfly: 92, 158.
companion wheat fly: 92, 77, 82
corn or boll worm: 83, 198; 86, 225; 98 9, 15.
corn plant louse: 86, 218
corn root louse: 89, XLVIII, 90, 135
corn root worms: 82, 94; 84 150; 89, XLVIII; 90 134; 92, XXXVIII; 202, 238; 93, 89, 96, 142; 94, XXXI; 96, 39, 55.
corn sphenophorus: 92 72.
corn stalk borer: 83, 199.
crane flies: 92, XXVI; 238, 243.
as food of robin: 92, 131.
cricket, northern mole: 94 XXXIV.
cucumber beetle, striped: 82, 77; 86, 217; 88, 161; 89, LII, 6, 143; 90, LIX, 229; 91, 45.
twelve-spotted: 86, 217; 89, XLIX; 90, 134.
curculio, plum: 82, 89, 83, 199, 200; 84, 152; 85, 189; 88, 132, 145; 89, L, 4, 133, 140; 90, LVIII, 225; 91, 42.
cabbage: 97, 50.
rhubarb: 90, XXIV, 232.
currant borer: 82, 85; 89, 6.
plant louse; 88, 157.
saw fly: 86, 210.
worm, imported: 82, 84; 83, 196, 200; 84, 152; 85, 187; 88, 152; 89, 6, 153.
cut worms: 82, 79; 83, 197; 84, 151; 86, 219, 229; 91, 51; 96, XXXIV.
cynifid leaf gall: 92, 157.
dagger moth caterpillars: 92, 173.
digger wasp: 98, 63.
dogwood saw fly: 92, 153.
electric light bugs: 89, LIV.
elm leaf caterpillar: 86, 228.
fall web worm: 86, 206; 92, 162.
fifteen-spotted ladybird: 92, 189.
flea-beetles: 82, 80; 83, 202; 84, 157; 91, 50; 93, 96, 142; 98-9, 122.
flea-like negro bug: 92, 211.
four lined leaf bug: 86, 211.
four-striped plant bug: 88, 152.
fruit bark beetle: 96, 23, 54.
giant root borer: 92, 198.
goldsmith beetle: 92, 197.

*Bulletins 76 and 77—page numbers are duplicated.

Insects, notes on—(Continued.)
gouty gall beetle: **94**, XXIX
grain plant louse: **89**, XLVII, 150; **90**, LVII.
grain sphenophorus: **92**, 72, 82.
grape-berry moth: **83**, 200; **92**, 180.
grape-cane gall maker: **99-0**, 195.
grape-root worm: **94**, XXXI; **95**, XVI, XXXIII, 77, 95.
grape-vine beetle, spotted: **88**, 169
caterpillar, pyramidal: **92**, 177.
fidia: **96**, 20.
grasshoppers: **85**, 191; **86**, 228, **89**, L; **96**, XXXIII.
greedy scale: **97**, 211.
green fly, the: **92**, 109
harlequin cabbage bug. **95**, XXXII; **96**, XXXIV, 35, 55.
heart-worm: **92**, 176
hedgehog caterpillar: **92**, 162
Hessian fly: **82**, 91; **83**, 196, 199, **84**, 42, 150; **88**, 131; **89**, XLIX; **90**, LIX; **91**, 133; **93**, 131; **98 9**, 257 (B. 107), **99-0**, 220 (B. 110); **00-1**, 236
hickory borer, painted **98 9**, 19.
hostile leaf hopper: **96**, 43
imbricated snout beetle: **88**, 167.
joint worm: **92**, XXXVII; 59, 62, 82; **93**, 134.
June bug: **82**, 78; **83**, 197.
katydid: **92**, 205.
lady beetle: **89**, XLVIII, 150.
bloodred: **89**, 170.
15-spotted: **92**, 189.
twice-stabbed: **97**, 203.
leaf rollers: **92**, 181, 185.
leather jacket: **92**, 238.
locust, Egyptian: **98**, 52.
leaf miner: **96**, XXXV.
seventeen-year **92**, 210; **96**, 37.
May beetle: **82**, 78; **83**, 197; **86**, 226.
negro bugs: **92**, 211, **94**, XXXVI.
oat fly: **86**, 221.
onion fly: **83**, 202.
onion thrip: **94**, XXXIII; **99 0**, 272.
orange striped oak worms: **92**, 172.
ox warble: **90**, XXII, 136.
oyster-shell bark-louse: **84**, 156; **90**, LVIII; **97**, 209.
peach tree borer: **82**, 84; **84**, 151.
pear blister beetle: **94**, XXXIV.
borer, sinuate: **97**, 42.
midge: **97**, 45.
tree slug: **86**, 204.
pea weevil: **82**, 79; **88**, 131, 163.
plantain curculio: **86**, 228.
plant lice, autumn history of. **88**, 156.
plum scale; **95**, XXXII.
potato beetle: **83**, 196, 201; **85**, 189; **88**, 168; **89**, 8.
stalk borer: **90**, LXII; **94**, XXXVI.
powder-post worms: **96**, 47, 56.
Putnam scale: **97**, 208.

Insects, notes on—(Continued.)
raspberry cane borer: **82**, 84; **88**, 154; **92**, 199.
maggot: **92**, 189.
geometer: **92**, 178.
gouty gall beetle: **92**, 191.
leaf roller: **92**, 181.
plume moth: **92**, 180.
root borer: **92**, 159.
root gall: **92**, 156.
sawfly: **89**, 5; **92**, 154.
slug: **88**, 155.
red humped apple tree caterpillar: **92**, 167.
red marked agrilus: **86**, 212.
red spider: **84**, 152; **98 9**, 254.
"red weevil": **91**, 92, 100, 161.
resplendent shield bearer: **86**, 207.
rhubarb curculio: **90**, XXIV, 232.
rhubarb snout beetle: **89**, 153, 170.
ring legged tree bug: **96**, 26, 54.
rocky mountain locust: **92**, 205.
rose chafer: **88**, 131, 150; **91**, 43; **92**, 193.
rose leaf hopper, **89**, 155.
rose scale: **92**, 208.
rose slug: **84**, 153.
saddle back caterpillar: **92**, 166.
San Jose scale: **94**, 81; **95**, XXXII; **96**, 211; **97**, 177 (B. 81): **98-9**, 185; **99-0**, 273
law concerning: **99 0**, XXVII.
scales: **84**, 156; **85**, 190.
scurfy bark-louse: **90**, LVIII, 128; **92**, 208, **97**, 210.
seed corn maggot: **94**, XXXIV.
seventeen-year locust: **92**, 210; **98**, 37
snowy tree cricket: **82**, 83; **86**, 212; **88**, 154; **89**, 5; **92**, 206.
square spittle bug: **92**, 210.
squash bug: **85**, 190.
plant louse: **96**, 38, 55.
vine borer: **82**, 77; **85**, 190.
stalk borers: **92**, 73, 82, 176.
strawberry crown borer: **83**, 201, **86**, 202.
cut worms: **86**, 203.
leaf roller: **82**, 83; **86**, 213.
root borer: **86**, 202.
root louse: **89**, LIII, 148.
root worm **86**, 200.
saw fly: **96**, 33, 55.
weevil: **92**, 205.
worm: **82**, 83; **94**, XXXIV.
straw and joint worms **93**, 134.
tarnished plant bug: **92**, 213.
tent caterpillar: **82**, 89; **83**, 199; **92**, 173.
tomato worm parasites: **89**, LI.
upholster bee: **92**, 158.
unicorn prominent: **92**, 168.
walnut caterpillar: **90**, LIV.
water bugs, giant: **89**, LIV.

Insects, notes on—(Continued.)
waved lagoa: 92, 166.
web worms: 96 44, 55.
wheat aphis: 86, 227.
joint worm: 86, 224.
midge: 91, 79, 92, 99, 105, 114, 161; 92, XXXVII.
stem maggot: 92, 74, 78, 82.
stem sawfly: 92, 69, 70, 82; 98-9, 13.
straw worm: 86, 224; 92, 63, 82.
thrips: 92, 207.
wire worms: 92, 222.
white grub: 86, 226; 89, XLVIII; 90, 133; 92, XXVI, 230; 99-0, 266.
white-marked tussock moth: 90, LV.
white-pine plant louse: 90, LXII.
willow grove plant louse: 88, 158; 90, LXII.
wire worms: 82, 93; 83, 198; 84, 155; 92, XXVI, 221, 222; 99-0, 267.
wood leopard moth: 97, 48.
woolly aphis of the apple: 98-9, 254.
woolly maple bark louse: 90, LIII.
yellow necked apple-tree caterpillar: 90, LV.
zebra caterpillar: 91, 50.

Japan clover: 92, XXXII.
Jerusalem corn: 96, 97.

Kaffir corn: 96, 97.

Lactation, effect of advance of on productivity of food: 93, 77.
Lawns, seeding and care of: 85, 211, 00-1, 240.
Leguminous plants and soil fertility: 96, 95.
Lettuce as a greenhouse crop: 92, 108, 95, 71.
effect of sub-watering on: 95, 66.
varieties of: 92, 111.
wild: 92, 141.
wild, fungous diseases of: 92, XXXIX, 145.
see also "Diseases of Plants."
Library of the Station: 88, 16; 96, XVII.
Limestone analyses: 98-9, 120; 00-1, 212, 213.
Litigation affecting the station: 92, VII.
Lombriz of sheep: 98, 165.
Lucerne: (see Alfalfa.)
Lumpy jaw: 90, XXI, 107.
Lung worms of sheep: 98, 163.

McDowell, Hon. J. A., address by: 97, LXIV.

Maintenance of fertility: see "Fertilizers."
Mangel wurzels: see "Beets, field."
Manure, barnyard, average composition of: 98-9, 140.
compared with fertilizers: 96, 155, 163 (see also "Fertilizers")
recovery of constituents of: 99-0, 62.
saving and applying: 82, 113; 99-0, 52.
value of: 95, 27; 97, 154, 175.
see also "Analyses" and "Fertilizers."

Melilotus as a forage crop: **96**, 89.
for green manuring: **92**, 85.
as a weed: **96**, XXXIX.
Meteorological reports: **82**, 99; **83**, 182; **84**, 204; **85**, 238; **86**, 261; **87**, 270; **88**, 181; **89**, XXXIV, **90**, XL; **91**, XXXV; **92**, 249; **93**, 145; **94**, 117, **95**, 161; **96**, 247; **98**, 327; **98 9**, 373; **99-0**, 249; **00-1**; 219.
Methods of work: **88**, 12.
Millets, variety tests: **96**, 99.
Milk, analysis of **83**, 104.
feeding for: **83**, 99; **85**, 88, 95; **93**, XX, 51.
possible improvements in production of: **93**, 79.
ratio of yield of to dry substance in food: **93**, 61.
Mummy fruits: **97**, 113.

Naming of plants and insects: **83**, 6; **84**, 10; **85**, 8.
Nematodes on roses: **94**, XXVII.
(see "Diseases of Plants.")
Nozzles for spraying: **95**, 106.
Nursery inspection: **98** VII; **98-9**, XI, 191.
Nursery stock, fumigation of: **98 9**, 193.
Nutritive ratio, the: **95**, 33.

Oats, bulletins on: **92**, Vol. 5, No. 1; **94**, 57; **96**, 67; **98-9**, 101.
annual yield of in Ohio: **96**, 109.
Bohemian: **85**, 55.
classification of varieties: **86**, 70.
cooperative tests with: **87**, 108; **88**, 63; **90**, 102.
depth of planting: **98 9** 176.
descriptive notes on varieties: **86**, 71.
fertilizers on (see "Fertilizers").
methods of culture: **92**, 16; **94**, 113; **96**, 16.
methods of seeding: **96**, 15; **98 9**, 176.
percentage of hull and kernel: **94**, 108.
preparation of seed bed: **98 9** 178.
proportion of grain to straw: **96**, 110.
sale of seed: **92**, 20.
seed tests: **83**, 170.
shrinkage of grain and straw: **94**, 111.
synonyms: **86**, 79; **88**, 67; **90**, 101.
thick and thin seeding: **87**, 104; **88**, 65; **90**, 104; **92**, 14; **94**, 111; **98-9**, 177, 181.
variety tests: **84**, 63; **85**, 50; **86**, 65; **87**, 100, 104; **88**, 59; **90** 99; **92**, 3, 6, 12; **94**, 97, 101; **96**, 1, 13; **98-9**, 161.
weights per bushel: **83**, 62; **94**, 107.
see also "Analyses," "Diseases of Plants," "Fertilizers" and "Insects."
Officers of the Station, duties of: **84**, 8.
Ohio Agricultural Experiment Station, its history and work: **97**, XXVII, XXXIII.
Onions, cost of growing: **83**, 145.
fertilizers on: **85**, 126.
seed tests of: **83**, 170, 176; **84**, 141; **85**, 125; **87**, 229.
thick and thin seeding; **84**, 141; **85**, 128; **87**, 229.
transplanting: **90**, XXV, 244; **96**, XXVI.
see also "Diseases of Plants," "Fertilizers" and "Insects."

Orchard spraying, financial aspects of: **91**, 207; **99-0**, 107, 119.
see "Spraying."
Osage orange, seed test of: **83**, 170.

Pastures, permanent seeding: **00-1**, 240.
Peach industry in Ohio: **98**, 179.
Peach yellows, law concerning: **95**, XXXVII; **96**, XVI, XXXVIII, 218; **97**, XV; **99-0**, XXVII.
see "Diseases of Plants."
Peas, notes on varieties: **87**, 241.
seed test of: **83**, 177, 180.
variety tests of: **83**, 137; **84**, 142; **85**, 128; **86**, 174; **87**, 236.
see also "Diseases of Plants" and "Insects."
Pear orchards. **83**, 146.
Pears, spraying for curculio and codling worm: **88** 145.
see also "Diseases of Plants" and "Insects."
Pepper, red, seed test of: **83**, 180.
Pickle industry, the: **98**, 99
Pig-feeding experiments: **83**, 132; **84**, 101; **85**, 80, **86**, 134; **87**, 181.
Plant diseases, Bulletin 121, on: **00-1**, 241.
Plants, directions for collecting and studying: **90**, 144.
Plants, diseases of, see "Diseases of Plants."
Plants identified: **84**, 171; **85**, 194, 223; **86**, 231; **87**, 286; **94**, XLI.
Plums, comparison of varieties: **99 0**, 151 (B. 113).
spraying for curculio: **88** 145.
see also "Diseases of Plants" and "Insects."
Post graduate work at the Station: **99 0**, XVII.
Potatoes, descriptive notes on varieties: **83**, 91; **85**, 63; **86** 150; **87**, 199; **88**, 124; **95**, 148.
fall and spring plowing for: **98**, 92.
keeping seed: **97**, 34.
late planting of: **96**, XXV; **97**, 35.
methods of culture: **84**, 91; **85**, 69.
methods of planting: **82**, 53.
seedling varieties: **85**, 69.
seed preparation: **82**, 53; **83**, 92; **85**, 70; **86**, 154; **87**, 206; **88**, 126; **96**, XXV.
southern vs. northern grown seed: **95**, 147.
sowing millet among: **98**, 95.
subsoiling for: **98**, 93.
statistics of production: **82**, 57.
variety tests of: **82**, 21, 51; **83**, 89; **84**, 84; **85**, 57; **86**, 146; **87**, 196; **88**, 117; **90**, XVIII, 5; **95**, XVII, 141; **96**, XXV; **97**, 39; **98**, 93; **99 0**, 269.
see also "Diseases of Plants," "Fertilizers" and "Insects."
Press bulletins: **99 0**, 263; **00 1**, 233.
Prickly comfrey: **82**, 95.
Prickly lettuce: **92**, 141.
legislation concerning: **97**, XV.
Printing, the Station's: **95**, XIV.
Publications: **82**, 22; **83**, 6; **84**, 10; **85**, 8, **88**, 15; **89**, XVI; **90**, XVI; **91**, XVI; **92**, XX; **93**, XVIII, XXI; **94**, XV; **95**, XV, XVIII; **98-9**, 393; **99-0**, 278; **00-1**, XIII.
Puccineæ, lists of: **92**, 134, 139.
Puget Sound seeds: **89**, 185.

Quince orchard: 83, 147.
Quince, see "Diseases of Plants."

Radishes, seed test of: 83, 177,
Radishes. variety test of: 85, 132; 87, 227.
Rape: 96, 102.
Raspberries, "Eureka" and D. M. Mohler: 95, 110.
production of dried fruit: 88, 114.
variety tests: 83, 148; 84, 107; 85, 108; 86, 188; 87, 254; 89, 105; 110; 90, 222; 91, 118; 92, XXXIII; 95, XVI, 108, 98-9, 72.
see also "Analyses," "Diseases of Plants," "Fertilizers" and "Insects."
Rations, calculation of: 95, 38.
Relation of the Station to the agriculture of the state: 99-0, XVI.
Removal of the Station: 90 XV; 91, V; 92, VII, XVI; 97, XXVII.
Robin, food of the: 92, XXV, 115.
Rose culture: 85, 215
Rules and regulations: 84, 7.
Rusts of Ohio, preliminary lists of: 92, 133.

Sacaline: 96, 104.
Samples and specimens, directions for sending: 82, 117; 83, 203; 84, 203.
San Jose scale, law concerning: 99-0, XXVII.
see also "Insects."
Scovel, Rev. S. F., 97, XXX.
Seed and soil treatment for insect pests and plant diseases: 97, Supp. to B. 79; 98-9, B. 102; 00-1, B. 121, 61.
Seeds, commission, tests of: 85, 172.
directions for sampling: 83, 181; 84, 203.
effect of age on germination of: 84, 201; 85, 183.
freezing of: 83, 179.
improvement of varieties through selection of: 82, 63.
impurities in: 85, 185.
influence of climate and latitude on: 82, 65.
Sheep, breed test of: 96, XXIX.
condition of: 95, XXIX.
grub in the head: 98, 178.
lung worms of: 86 293; 98, 163.
selection of: 94, XXIV.
stomach worms of: 86, 293; 98, XV, 163 (B. 91); 98-9, XIII; 99-0, XII, 199, 263.
Shrubs, ornamental: 85, 215.
Silage, feeding: 89, 84.
mining: 89, 86.
vs. beets: 89, 89; 93, 51.
weighting: 89, 84.
see also "Corn silage."
Silos, building: 89, 74.
filling: 89, 84
Soils, description of those used in fertilizer tests: 99 0, 4.
pot experiments with: 85, 231; 90, 56.
Soja or soy bean: 96, 85; 99-0 270
Sorghum, composition of syrup: 99-0, 192.
co-operative tests: 99-0, 189.
free distribution of seed: 99-0, 189, 268.
sugars found in juice: 99-0, 192.
tests of seed: 83, 170.

Spray calendars: **97**, (B. 79, Supp.) **98 9** (B 102); **00-1**, 61.
Spraying machinery: **89**, 11; **90**, 120; **91**, XXV; **95**, 106; **98**, 115.
mixtures, preparation of: **91**, XX; **95**, 103; see also "Spray calendars."
orchards: **91**, 193; **93**, 3; **95**, 97; **99-0**, 93.
summary of work in: **92**, XXXV; **93**, XVIII, 13; **99 0**, 93.
Spurry: **96**, 104.
State and the Experiment Station, the: **97**, LI.
relation of to agricultural investigation: **97** LXI.
State University, relation of Station to: **82**, 22; **89**, XVI; **90**, XVI.
Station's work, the: **82**, 109; **83**, 8; **84** 9; **85** 7; **86**, 8; **87**, 9; **88**, 8; **89**, XIV; **90**, XVIII: **91**, XIV: **92**, XVI; **93**, XVI; **94**, XIII; **95**, XIII; **96**, XII; **97**, XIII; **98**, XIII; **98 9**, XI; **99-0**, XII, **00-1**, XI.
Strawberries, co-operative testing of: **90**, 209.
cross fertilization of: **84** 119; **85**, 107; **87**, 253.
cultural notes: **94**, 35; **98**, 4; **98-9**, 63.
essentials of a good variety: **90**, 210.
mulching: **84**, 120; **85**, 106; **94**, 40.
new method of propagating: **86**, 187.
spring vs. fall set plants: **88**, 104; **94**, 36.
summer planting of: **98**, 2.
varieties adapted to special localities: **84**, 121.
variety tests: **83**, 147; **84**, 108, 126; **85**, 99; **86**, 180; **87**, 245; **88**, 104; **89**, 101; **90** XXIII; 209; **91**, 115; **92**, XXXIII; **94**, 34; **98**, 1; **98 9**, 63.
water in culture of: **98**, 4; **98 9**, 63.
see also "Diseases of Plants" "Fertilizers" and "Insects."
Straw, ratio to grain: **94**, 6; **96**, 110; **99-0**, 45.
Student labor: **88**, 13; **89**, XVI.
Subirrigation in the greenhouse: **92**, 101; **94**, XXVII; **95**, XVI, **57**.
Sub-stations, appropriation for: **92**, X; **94**, XV; **95**, XIV.
Sugar beets: see "Beets."
Sugar industry, the: **84**, 230; (See Beet-sugar).
per capita, consumption of: **97**, 6.
Sweet clover as a forage crop: **96**, 89.
for green manuring: **92**, 85.
as a weed: **96**, XXXIX.
Swine plague: **86**, 283; **88**, 178.
Technical bulletins: **89**, XXI; **90** XXV.
Teosinte: **82**, 95; **96**, 98
Threadworms in sheep: **98**, 167.
Timothy, annual yield in Ohio: **96**, 109.
seed tests of: **83**, 170, 180.
see also "Fertilizers."
Tomatoes as a greenhouse crop: **92**, 106.
notes on varieties: **83**, 139; **84**, 147; **85**, 135; **86**, 172; **87**, 234.
seed from early and late ripening: **83**, 140.
seed tests of: **83**, 171, 177; **87**, 231.
test of potted plants: **83**, 140.
variety tests of: **83**, 139; **84**, 146; **85**, 134; **86**, 168.
see also "Diseases of Plants" and "Insects."
Treasurer, appointment of: **94**, VIII.
Treasurer's report: **82**, 119; **83**, 204; **84**, 234; **85**, 254, **86**, 308; **87**, 299; **88**, 199, **89**, X; **90**, IX; **91**, X; **92**, XII; **93**, XI; **94**, IX; **95**, IX; **96**, VIII; **97**, VIII; **98**, VIII; **98-9**, VI; **99-0**, VI; **00-1**.

Tubercles on leguminous plants: **00 1**, 27.
Tuberculin test, the: **98-9**, 291; **00-1**, 242.
Tuberculosis, bovine: **98 9**, XI, 289 (B. 108); **00 1**, 237, 242.
an outbreak of: **98 9**, 295.
prevalence of: **98-9**, 324.
the literature of: **98-9**, 371.
municipal inspection against: **98-9**, 333.
the state control of; **98-9**, XIII, 369.
deaths from in Ohio: **98-9**, 344.
decrease of: **98 9**, 367.
heredity of: **98-9**, 363.
infantile, in Ohio: **98-9**, XII, 347.

Uromyces, lists of: **92**, 133 139.

Varieties, improvements of through crossing and hybridizing: **82**, 66.
through seed selection: **82**, 63.
Variety testing, difficulties in: **95**, 141; **96**, XXV.
value of: **96**, XIII.
Vegetables, experiments with—see "Garden Vegetables."
from Japan, experiments with: **82**, 63.
Vetches: **96**, 88.
Veterinarian, report of: **86**, 283; **88**, 177; **89**, XXXII; **90**, XXXVIII.
Vines, ornamental climbing: **85**, 208.

Water bench, the: **92**, 102.
Watering plants, hints for: **85**, 207.
Water in strawberry culture: **98**, 4; **98 9**, 63.
Weed laws of Ohio: **94**, 62; **95**, 4.
S. Dakota: **94**, 65.
Wisconsin: **94**, 64.
Weed manual: **97**, 249.
Weeds along thoroughfares: **95**, 1
classification of: **94**, 59.
descriptive notes on: **84**, 164; **85**, 194; **86**, 17.
dispersal of: **84**, 160; **94**, 60.
habits of growth of. **84**, 162.
hints for destruction of. **84**, 163.
how cutting destroys: **95**, 3.
identification of: **84**, 171; **86**, 231; **95**, XL.
legislation required: **96**, XXXIX.
on different soils: **85**, 193.
prolificacy of: **84**, 158; **85**, 196.
prickly lettuce: **92**, 143.
report on: **83**, 187; **84**, 158; **85**, 193; **86**, 230; **94**, 59.
Russian thistle: **94**, 53.

(See **97**, 393, for index to weed manual.)

Wheat, after melilotus: **92**, 85.
annual yield of in Ohio: **96**, 109.
classification of varieties: **86**, 54; **87**, 70; **88**, 46.
co-operative tests: **83**, 41; **84**, 55; **85**, 15; **87**, 80; **88**, 34; **90**, 200.
cross drilling: **97**, 228.
culture of in Ohio, forty years of: **91**, 159.
degeneration of varieties: **92**, 87; **97**, 231; **99-0**, 235.

Wheat—(Continued.)
depth of seeding: **86**, 35; **87**, 45; **88**, 56; **89**, 118; **90**, 180; **91**, 81.
descriptive notes on varieties: **82**, 28; **83**, 15, 24; **84**, 32; **86**, 17; **87**, 27; **88**, 33, 39.
early and late harvesting: **83**, 50.
manuring: **97**, 229.
plowing for: **83**, 30.
seeding: **83**, 30; **84**, 40; **86**, 32; **87**, 41; **88**, 53; **89**, 117; **90**, 178; **97**, 225; **99 0**, 234.
feeding value of: **95**, 15.
improvement by selection: **84**, 24, 189.
large yields at the station: **89**, 131.
lodging of: **93**, 24.
methods of culture: **88**, 50; **89**, 118; **90**, 180.
seeding: **83**, 39; **84**, 54; **86**, 35; **87**, 47; **88**, 56, **92**, 83; **97**, 226.
northwestern seed: **97**, 222.
old and new seed: **99-0**, 236.
ratio of straw to grain: **93**, 25; **96**, 110.
red and white, comparative yields of: **86**, 25; **87**, 71; **88**, 31; **89**, 130; **90**, 193; **97**, 223.
sale of seed: **89**, 131.
seed test: **83**, 170, 178, 180; **84**, 186.
shrinkage in the granary: **92**, 86.
smooth and bearded, comparative yields of: **84**, 61; **86**, 27; **87**, 25; **88**, 25; **89**, 130; **90**, 193; **97**, 223.
spring treatment: **83**, 28; **86**, 37; **87**, 51.
varieties: **99-0**, 237.
statistics of export: **82**, 52.
production: **82**, 31; **84**, 62; **85**, 18; **86**, 64; **96**, 109.
suggestions to growers: **00-1**, 206.
synonyms: **89**, 130; **97**, 223.
thick and thin seeding: **83**, 26, **84**, 37; **85**, 12; **86**, 30; **87**, 37; **88**, 50; **89**, 115; **90**, 175; **91**, 77; **97**, 225; **99 0**, 233
treatment of previous crop: **97**, 230.
variety tests: **82**, 20, 23; **83**, 14, 22; **84**, 12, 26, 55; **85**, 12; **86**, 11; **87**, 11; **88**, 23; **89**, 121; **90**, 184; **91**, 89; **92**, 89; **97**, 213; **99-0**, 213; **00-1**, 235.
on black soil: **90**, 198.
vitality of different classes of: **83**, 49; **84**, 61.
winter destruction: **85**, 10; **99-0**, XIII.
protection: **83**, 28; **84**, 39, **86**, 36; **87**, 49.
see also "Diseases of Plants," "Fertilizers" and "Insects."

Woodland, how to improve: **86**, 256.

INDEX TO TECHNICAL NAMES.

Abutilon Abutilon, **97**, 310.
avicennae, **83**, 190; **84**, 159; 170.
Acalypha Virginica, **97**, 308.
Achillea millefolium, **83**, 192, **84**, 157; **97**, 356.
Actinonema Rosae, **00-01**, 53.
Acronycta brumosa, **92**, 173.
oblinita, **92**, 173.
spinigera, **92**, 173.
xyliniformis, **92**, 173.
Adoxus obscurus, **95**, 82.
Aecidia, lists of, **92**, 138; 140.
Aecidium Berberidis, **00-01**, 17.
Aegeria cucurbitae, **82**, 77; **85**, 190.
exitiosa, **82**, 84.
tipuliformis, **82**, 85.
Agonoderus pallipes, **92**, 120.
Agrilus ruficollis, **82**, 84; **86**, 212; **92**, 191; **94**, XXIX.
sinuatus, **97**, 42.
Agrimonia parviflora, **97**, 303.
stricta, **97**, 303.
Agriotes, mancus, **92**, 222.
Agropyron repens, **97**, 270.
Agrostemma Githago, **97**, 285.
Agrostis canina, **84**, 175; **85**, 219.
stolonifera, **84**, 175; **85**, 219.
vulgaris, **84**, 175; **85**, 212; **219**.
Ailanthus glandulosus, **97**, 307.
Alisma Plantago-aquatica, **97**, 262.
Allium vineale, **97**, 273.
Allotria brassicae, **93**, 111.
Allyssum alyssoides, **97**, 301.
Alopecurus pratensis, **84**, 178.
Alsine media, **97**, 286.
Alternaria Brassicae f-nigricans, **96**, 235.
Solani, **96**, 241; **00-01**, 50.
Sp., **98-9**, 230; **99-00**, 140; **00 01**, **39**.
Amaranthus albus, **95**, XL; **97**, 282.
blitoides, **97**, 282.
hybridus, **97**, 283.
retroflexus, **83**, 190.
spinosus, **85**, 195; **95**, XLI; **97**, 283.
Amblynotus iowensis, **94**, XXXIX.
Amblyteles suturalis, **98-9**, 12.
Ambrosia artemisiæfolia, **83**, 189; **84**, 159; **97**, 352.
trifida, **97**, 353.
Ampelanus albidens, **97**, 322.
Ampeloglypter sesostris, **99-00**, 195.

Ampelopsis quinquefolia, 86, 304; 99-00, 195.
Anarsia lineatella, 86, 202.
Anasa tristis, 85, 190.
Anchylopera fragariae, 82, 83
Andropogon Halepensis, 97, 262.
provincialis, 97, 263.
scoparius, 97, 264.
Virginicus, 97, 263.
Angelica atropurpurea, 97, 315.
Anisopteryx pometaria, 96, 21.
vernata, 82, 90; 83, 199; 85, 187; 86, 204; 205; 88, 132; 96, XXXIII; 21.
Anisota senatoria, 92, 172.
Anomala binotata, 92, 197.
Antennaria plantaginifolia, 97, 352.
Anthemis arvensis, 84, 159; 97, 357.
Cotula, 97, 357.
Anthonomus signatus, 92, 205.
Anthomyia ceparum, 83, 202.
(?), 92, 189.
Authoxanthum odoratum, 84, 178; 85, 212
Apanteles, 94, XXXVI.
congregatus, 98-9, 12.
limenitidis, 98 9, 12.
Apatelodes torrefacta, 92, 187.
Aphelinus mali, 92, XXXVI.
Aphidius chenopodiaphidis, 94, XXXVI.
phorodontis, 92, XXXVI.
Aphis brassicae, 92, XXXVII; 93, 109.
cucumeris, 96, 38.
forbesii, 89, 148; 170
maidis, 86, 218; 89, XLVIII, 93, 138.
maidis-radicis, 93, 138.
mali, 93, 109.
persicae niger, 95, XXXIV; 98, 236.
prunicola, 98 9, 252.
rubicola, 92, 209.
rumicis, 92, XXXVI.
salicti, 88, 158.
trifolii, 89, L.
Aplodes rubivora, 92, 178.
Aphrophora quadrangulatus, 92, 210.
Apocynum androsæmifolium, 97, 319.
cannabinum, 97, 319.
Arabis lævigata, 97, 301.
Archenomus bicolor, 98-9, 25.
Arctium Lappa, 97, 359.
Argemone Mexicana, 97, 290.
Arrhenatherum elatius, 00-01, 41.
avenaceum, 85, 221.
Artemisia biennis, 97, 359.
Asclepias incarnata, 97, 320.
Syriaca, 97, 320.
tuberosa, 97, 320.
Ascochyta Pisi, 00-01, 42.

Asopia costalis, **88**, 134; **91**, 54; **93**, 124.
Asparagus officinalis, **97**, 273.
Aspidisca splendoriferella, **86**, 207.
Aspidiotophagus citrinus, **98-9**, 24.
Aspidiotus ancylus, **97**, 208.
camelliæ, **97**, 211.
juglans-regiæ, **97**, 211.
perniciosus, **96**, 211; **97**, 177; **98-9**, 185-200.
Aster cordifolius, **97**, 349.
ericoides pilosus, **97**, 349; **350**.
lævis, **97**, 351.
Atriplex, **95**, XL.
hastata, **97**, 280
patula, **97**, 280.
Attacus cecropia, **92**, 170.
Avena elatior, **84**, 178
fatua, **97**, 267.
nuda, **85**, 56; 86, **75**.
pratensis, **84**, 178.
sativa, **85**, 55; 56; **86**, 71; **75**.

Bacillus amylovorus, **97**, 125: **00-01**, 15; **47**.
anthracis, **86**, 291.
solanacearum, **96**, 245; **00-01**, 50.
tracheiphilus, **96**, 233, **98-9**, 221; **00-01**, **30**.
Barbarea Barbarea, **97**, 299.
Bassareus mammifer, **92**, 201.
Bassua scutellatus, **98-9**, 12.
Belostoma americanum, **89**, LIV.
Belvosia unifasciata, **98-9**, 12.
Bembecia marginata, **92**, 159.
Benacus griseus, **89**, LIV.
Bibio albipennis, **92**, 118; 123.
Bidens bipinnata, **83**, 189; **97**, **355**.
connata, **97**, 355.
frondosa, **97**, 355.
trichosperma, **97**, 251; **355**.
Blennocampa paupera, **92**, 152.
Blissus leucopterus, **88**, 131; 164; **89**, XLIX; **90**, LIX; **93**, 134; 135; **94**, XXXIII; **96**, XXXIII; 59; **98-9**, 238; 248.
Botrytis cinerea, **96**, 221.
vulgaris, **96**, 221; **99 00**, 139; **00 01**, **37**.
Brachystichta fidiæ, **95**, 85-94; **96**, XXXVI.
Brachytarsus variegatus, **92**, 67.
Brassica nigra, **97**, 297.
Sinapistrum, **97**, 297.
Bremia Lactucæ, **96**, 226; **99-00**, 139; **00-01**, **37**.
Brochymena annulata, **94**, XXXIV: **96**, 26.
Bromus secalinus, **83**, 190; **85**, 186; **97**, 269.
tectorum, **97**, 269
unioloides, **85**, 221.
Bruchus fabæ, **82**, 80.
obsoletus, **88**, 131; 163; **89**, LII.
pisi, **82**, 79; **88**, 131; 163.

Bucculatrix pomifoliella, **94**, XXXVI.
Bursa Bursa-pastoris, **97**, 300.
Byturus unicolor, **92**, 189.

Cacœcia rosana, **92**, 180.
Cæoma nitens, **91**, 127; **92**, 137; **97**, 107; 302; **00 01**, 19.
Callipterus trifolii, **89**, L.
Caloptenus femur-rubrum, **89**, L.
Calosoma calidum, **96**, XXXIV.
Calyptus tibiator, **99-00**, 197.
Calystegia sepium, **83**, 190.
Camelina sativa, **97**, 300.
Capsella Bursa-pastoris, **84**, 158; **85**, 197.
Cardamine, **00 01**, 7.
Carduus altissimus, **97**, 363.
arvensis, 95, XL; **97**, 360; **361**.
lanceolatus, **97**, 362.
muticus, **97**, 363.
Carex sp., **97**, 272.
Carium Carui, **97**, 316.
Carpocapsa pomonella, **82**, 85; **83**, 199; **86**, 208; **88**, 132; **89**, LI; **90**, LIX.
Carpophilus brachypterus, **92**, 191.
Cassia Chamæcrista, **97**, 304.
Marylandica, **97**, 304.
Caterva catenaria, **92**, 179.
Catolaccus tylodermæ, **99-00**, 197.
Cecidomyia destructor, **82**, 91; **83**, 199; **89**, XLIX; **90**, LIX; **91**, 133; **93**, 120; **132**; **98-9**, 257-288.
leguminicola, **86**, 218; **88**, 133; **89**, L; **91**, 54; **93**, 120; **97**, 46.
sp, **92**, 187.
Celastrus scandens, **92**, 123.
Cenchrus tribuloides, **97**, 267.
Centaurea Cyanus, **97**, 363
Ceutorhynchus rapae, **97**, 50.
Cephus pygmaeus, **92**, 69; 70.
Cerastium viscosum, **97**, 287.
vulgatum, **97**, 287.
Ceratina dupla, **92**, 158.
Cercospora althaeina, **00 01**, 36.
angulata, **97**. 99.
Apii, **97**, 315; **00-01**, 22; 23.
beticola, **98-9**, 85; 121; **00-01**, 18; 55; **172**.
Citrullina, **98-9**, 232; **00-01**, 58.
Cucurbitae, **98-9**, 222; **00-01**, 30.
dubia, **97**, 279.
Violae, **00-01**, 58.
Cercosporella persica, **98**, 233.
Ceresa bubalus, **90**, LVIII.
Chaetocnema parcepunctata, **96**, XXXV.
Chalcis ovata, **93**, 107.
Chamaenerion angustifolium, **97**, 314.
Chamaeraphis glauca, **97**, 265.
viridis, **97**, 265.
Chelymorpha argus, **92**, 204.

Chenopodium album, **83**, 190; **94**, XXXVI; **97**, 279.
anthelminticum, **97**, 279.
Botrys, **97**, 280.
glaucum, **97**, 280.
Chilocorus bivulnerus, **97**, 203.
Chionaspis furfurus, **90**, LVIII; 92, 208; **97**, 210.
vitis, **98-9**, 24.
Chiropachys colon, **96**, 26.
Chlamys plicata, **92**, 200.
Chrysanthemun Leucanthemum, **84**, 164; **97**, 357; 358.
Chrysobothris femorata, 82, 88; **86**, 209.
Chrysopsis Mariana, **97**, 348.
Cicada septendecim, **92**, 210; **98**, 37.
tibicem, **98**, 51.
Cichorium Intybus, **97**, 363.
Cicuta maculata, **97**, 316.
Cimex lectularius, **96**, 66.
Cimicifuga racemosa, **97**, 287.
Cintractia Sorghi-vulgaris, **00-01**, 19, **54**.
Cirrospilus flavicinctus, **94**, XXXVI.
Cirsium arvense, **84**, 165.
lanceolatum, **83**, 192; **84**, 159.
Cladosporium carpophilum, **97**, 118; **98**, 221; **99-00**, 136; 142; **00-01**, **45**.
cucumerium, **96**, 234; **99-00**, 139; **00-01**, 30.
fulvum, **96**, 237; **99-00**, 140; **00-01**, 57.
Claviceps purpurea, **00-01**, 54.
Clisiocampa americana, **82**, 89.
californica, **92**, 173.
Cobaea scandens, **85**, 209.
Coccinella 9-notata, **93**, 111.
sanguinea, **89**, 150; 170.
Coccophagus cognatus, **93**, 125.
flavoscutellum, **93**, 125.
lecanii, **93**, 125.
vividus, **93**, 125.
Coelinius meromyzae, **92**, 76; **79**.
Coleosporia, list of, **92**, 137; 140.
Coleosporium, **97**, 347.
Colletotrichum Lagenarium, **96**, 237; **98**, 117; **98-9**, 221; 229; **99-00**, 140; **142**; **00-01**, 17; 28.
malvarum, **00-01**, 36.
venetum, **00-01**, 19; 52.
Coniothyrium Diplodiella, **00-01**, 35; 88; **101**.
Conium maculatum, **97**, 316.
Conotrachelus nenuphar, **82**, 89; **83**, 200; **85**, 189; **88**, 132; 134; **89**, L; **90**, LVIII.
Convolvulus arvensis, **97**, 322.
sepium, **97**, 323; 324.
Copidosoma truncatellum, **88**, 161.
Coreus tristis, **82**, 81.
Corimelaena pulicaria, **92**, 211; **94**, XXXVI.
Cornus candidissimus, **97**, 316.
Coryneum Beyerinckii, **98**, 205.
Cosmocema citripes, **93**, 117.
Cosmopepla carnifex, **92**, 212.

Cossus ligniperda, 93, 103.
Cotalpa lanigera, 92, 197.
Crambus interminellus, 96, 44
laqueatellus 96, 44.
luteolellus 96, 44.
mutabilis, 96, 44.
zeellus, 96, 44.
Crioceris asparagi, 82, 80; 93, 85; 87; 88; 121; 94, XXXIII; 96, XXXIV; 97, 273.
12 punctata, 93, 121.
Cryptocephalus binominis, 92, 201.
quadruplex, 92, 201.
venustus, 92, 201.
Cuscuta Epilinum, 97 325; 00 01, 33.
Epithymum, 97, 325; 00 01, 26.
Gronovii, 97, 326.
Cyaniris pseudargiolus, 89, L.
Cylas formicarius, 93, 123.
Cyllene pictus, 98 9, 19; 26.
robiniae, 93, 122; 98 9, 19, 26.
Cylindrosporium Padi, 97, 123; 99 00, 117; 142; 00 01, 25; 49.
Cynoglossum officinale, 97, 326.
Cyperus diandrus, 97, 271.
esculentus, 97, 271.
strigosus, 97, 271.
Cystopus Bliti, 97, 282; 283; 00-01, 18; 173.
candidus, 97, 294; 00 01, 21; 37.
Ipomoea-panduranae, 97, 322; 00 01, 56.
portulacae, 97, 284.

Dactylis glomerata, 84, 176; 85, 219.
Datana angusii, 90, LIV; 92, 121; 124.
ministra, 90, LV.
Danthonia spicata, 97, 268; 00 01, 115.
Datura Stramonium, 97, 338.
Tatula, 97, 338
Daucus Carota, 83, 192; 84, 166; 97, 315.
Delphinium Consolida, 97, 287.
Deltocephalus inimicus 96, 43.
Diabrotica longicornis, 82, 94; 84, 150; 89, XLIX; 92, XXXVIII; 93, 89; 92; 122; 137; 138; 94, XXXI; 96, 39; 98-9, 239.
12-punctata, 86, 217; 89, XLIX; 90, 134; 92, 202; 238; 93, 122; 138.
vittata, 82, 77; 86, 217; 88, 161; 89, LII; 143; 93, 92.
Dianthus Armeria, 97, 286.
Diaspis amygdali, 98-9, 22; 25; 26; 196.
ostreæformis, 98-9, 24.
rosae, 92, 208.
Diastrophus cuscutæformis, 92, 156.
nebulosus, 92, 157.
Diatræa saccharalis, 93, 122.
Dinocarsis thyridopterygis, 93, 107.
Diospyros Virginiana, 97, 318.
Diplosis aphidiphagus, 93, 111.
pyrivora, 97, 45.
tritici, 91, 99; 161; 92, XXXVII; 93, 120.

Dipsacus sylvestris, **97**, 346.
Disonycha triangularis, **96**, XXXV.
Dissosteira carolina, **92**, 122.
Dolerus arvensis, **92**, XXXVII; **98-9**, **15.**
collaris, **98-9**, 15.
Doryphora 10-lineata, **83**, 201; **85**, 189; **88**, 168; **93**, **122.**
Dothidea pomigena, **97**, 134.
Draba Caroliniana, **97**, 300.
verna, **97**, 300.
Drasteria amabilis, **93**, 95.
Dryocampa senatoria, **92**, 118.
Dynastes tityus, **93**, 123.
Dysodia chrysanthemoides, **97**, 356.

Eccopsis permundana, **86**, 213.
Echium vulgare, **97**, 329.
Elachistus ohioensis, **94**, XXXVI.
Elasmus nigrescens, **94**, XXXIX.
Elaters, **82**, 93; **83**, 198.
Eleusine Indica, **97**, 268.
Emphytus maculatus, **82**, **83.**
Empoa albopicta, **88**, 152.
Empoasca albopicta, **89**, LIII.
Empretia stimulea, **92**, 166.
Empusa aphidis, **92**, XXXVI.
Encyrtus flavus, **92**, XXXVI; **93**, 124; **125.**
Entomophthora sphærosperma, **96**, 31.
Entomosporium maculatum, **97**, 126; **00-01**, **48.**
Epargyreus tityrus, **89**, L.
Ephestia kuehniella, **93**, 124.
Epicærus imbricatus, **88**, 167.
Epicauta cinera, **93**, 99.
lemniscata, **93**, 99.
pennsylvanica, **93**, **99.**
vittata, **93**. 99; 100.
Epilobium, sp., **97**, 314.
Epitrix parvula, **96**, 19.
Equisetum arvense, **97**, 261.
Eragrostis major, **97**, 268.
Erechthites hieracifolia, **97**, 359.
Erigeron annuus, **83**, 191; **97**, 292; **351.**
Canadensis, **85**, 196; **97**, **352.**
Philadelphicus, **97**, 352.
Erycus puncticollis, **94**, XXXV.
Erysiphe Cichoracearum, **97**, 329; 347; **00-01**, 30; **58.**
communis, **97**, 277; 359; **00-01**, **42.**
graminis, **00-01**, 19.
pannosa, **00-01**, 53.
Eudemus botrana, **83**, 200; **92**, 180.
Eulophus tricladus, **94**, XXXIX.
Euonymus atropurpureus, 94, XXXIX.
Eupatorium ageratoides, **97**, 348.
perfoliatum, **97**, 348.
purpureum, **97**, 348.
Eupelmus allynii, **92**, 68; **93**, **134.**

Euphorbia corollata, **97**, 308.
Cyparissias, **97**, 309.
maculata, **97**, 309.
nutans, **97**, 308.
Eurytoma fulvipes, **92**, 61.
hordei, **92**, 60.
secalis, **92**, 61.
tritici, **92**, 60.
Euschistus variolarius, **92**, 212.
Euzophera semifuneralis, **93**, 124.
Exartema permundana, **92**, 181.
Exoascus deformans, **98-9**, 201; **99-00**, 122; **142**; **00-01**, **44**.
pruni, **97**, 117.

Feltia herilis, **95**, XXXII.
Fenusa rubi, **92**, 152.
Festuca dumetorum, **84**, 177.
duriuscula, **84**, 177.
elatior, **84**, 177; **85**, 221; **97**, 270.
ovina, **84**, 177.
peterophylla, **84**, 177.
pratensis, **84**, 177.
rubra, **84**, 177.
sylvatica, **84**, 177.
tenuifolia, **84**, 177.
Fidia lurida, **95**, 78.
viticola, **93**, XXXVI; **94**, XXX; **95**, 77-95; **96**, XXXVI; **20**.
Fidiobia flavis, **95**, 84-94.
Fidiorbia flavipes, **94**, XXX.
Frontina armigera, **98-9**, 18.
frenchii, **98-9**, 18.
Fusarium, **00-01**, 22.
niveum, **98-9**, 222; **00 01**, 30.
roseum, **98-9**, 40; **99 00**, 141; **00-01**, **59**.
Fusicladium dentriticum, **97**, 129; **99-00**, 95; **141**.
pirinum, **97**, 126; **00 01**, 48.
Fusisporium culmorum, **91**, 92; **92**, 147; **148**.
Hordei, **92**, 149.
Lolii, **92**, 149.
Solani, **92**, 148.

Galium aparine, **97**, 345.
Gelechia cerealella, **93**, 119.
Geranium sp., **97**, 307.
Gibberella Saubinettii, **98-9**, 40; **41**; **99-00**, **141**.
Glecoma hederacea, **97**, 331.
Gloeosporium apocryptum, **00-01**, 38.
fructigenum, **97**, 134; **00-01**, **12**.
laeticolor, **98**, 225.
malicortis, **00-01**, 14.
nervisequem, **00-01**, **56**.
phomoides, **00-01**, 56.
Rosae, **00-01**, 54.
venetum, **97**, 102; **99-00**, **116-142**.
Glycine hispida, **96**, 85.

Gnaphalium polycephalum, **97**, 354.
uliginosum, **97**, 354.
Gnomonia Ulmea, **00-01**, 32.
Gonotocerus brunneus, **93**, 117.
Gortyna nitela, **86**, 222; **92**, 73.
zeæ, **83**, 199.
Graphops pubescens, **86**, 200; 201.
Grapta comma, **92**, 158.
Gryllotalpa borealis, **94**, XXXIV.
Gymnosporangium macropus, **92**, 137; **00-01**, 23.

Habrocytus aulacis, **94**, XXXIX.
Hadena devastatrix, **93**, 138; 141.
fractilinea, **93**, 139; 141.
misera, **93**, 140.
stipata, **93**, 138; 139; 141.
Hæmatobia serrata, **93**, 121.
Haltica striolata, **82** 80; **83**, 202; **84**, 157.
Haltichella perpulchra, **98 9**, 12.
Halticus bractatus, **96**, XXXV.
Harpiphorus maculatus, **94**, XXXIV; **96**, 33.
varianus, **92**, 153.
Hedeoma pulegioides, **97**, 330.
Hedera Canariensis, **85**, 209.
helix, **85**, 208.
Helenium autumnale, **97**, 356.
Helianthus sp., **97**, 354.
Heliothis armigera, **83**, 198; **86**, 225; **93**, 124; 138; **98-9**, 15-26.
Helminthosporium carpophilum, **98**, 222; **99-00**, 121; 136; 142; **00-01**, **44**.
graminum, **00 01**, 27.
Hemerobius occidentalis, **94**, XXXIX.
Hemerocallis fulva, **97**, 272.
Hemiteles thyrodopterigis, **93**, 107.
utilis, **93**, 107.
Heterapoda venatorius, **93**, 126.
Heterodera radicicola, **00 01**, 31.
Heteropus ventricosus, **92**, 68; 79; **96** XXXVI.
Heterosporium echinulatum, **96**, 232; **00-01**, 22.
Hibiscus Trionum, **97**, 311.
Hicoria sp., **97**, 274.
Hieracium aurantiacum, **95**, XLI; **97**, 363; **364**.
Hippodamia glacialis, **93**, 111.
Hoplophora arctata, **94**, XXX; **95**, 84.
Hordeum jubatum, **97**, 271.
Hydrœcia nitela, **92**, 176; **93**, 138.
Hylastes obscurus, **99 00**, 143.
trifolii, **88**, 133; **91**, 53; **96**, 31.
Hylesinus trifolii, **93**, 120; **94**, XXXVI.
Hypera punctata, **96**, 28.
Hypericum perforatum, **97**, 312; **313**.
prolificum, **97**, 312.
Hyphantria cunea, **92**, 162.
Textor, **86**, 206.

Ichneumon jucundus, **98-9**, 12.
Inula Helenium, **97**, 354.
Ipomœa hederacea, **97**, 322.
pandurata, **97**, 322.
Isocratus vulgaris, **94**, XXXVI.
Isosoma allynii, **92**, 64.
elymi, **92**, 64
grande, **86**, 224; **92**, 65; 66; **93**, 133.
hordei, **86**, 224; **92**, 59; 61; 64; XXXVII; **93**, 134.
tritici, **86**, 224; **92**, 63; 65; **93**, 133; 134.
Iulus impressus, **92**, 216.

Juncus effusus, **97**, 272.
tenuis, **97**, 272.

Kalmia latifolia, **97**, 318.
Kuhnia eupatorioides, **97**, 348.

Lachnosterna, **93**, 108, 137.
fusca, **82**, 78; **83**, 197; **86**, 226; **92**, 230.
Lachnus salicicola, **88**, 158.
strobi, **90**, LXII.
Lactuca Canadensis, **97**, 365.
sagittifolia, **97**, 365.
Scariola, **92**, XXXIX, 141; 146; **95**, XL; **97**, 367.
Laestadia Bidwellii, **00-01**, 34, 88.
Lagoa crispata, **92**, 166.
Lamium amplexicaule, **97**, 332.
Lampronota frigida, **98-9**, 15.
Languria mozardi, **90**, 235.
Lappa major, **84**, 160; **85**, 197.
Lappula Lappula, **97**, 327.
Virginiana, **97**, 327.
Lasioptera farinosa, **92**, 188.
Lasius americanus, **98-9**, 254.
brunneus, **94**, XXX.
brunneus var. aliensus, **95**, 84.
flavus, **93**, 114.
Lathyrus sylvestris, **96**, 89.
Lecanium hesperidum, **92**, XXXVI; **93**, 124.
Legouzia perfoliata, **97**, 346.
Leonurus Cardiaca, **85**, 197; **97**, 332.
Lepidium campestre, **95**, XL; **97**, 292; 293.
Virginicum, **84**, 159; **85**, 197; **97**, 293.
Leptothyrium pomi, **97**, 133; **00-01**, 13.
Leptotrachelus dorsalis, **92**, 68.
Lespedeza violacea, **97**, 306.
Leucania unipuncta, **85**, 191; **93**, 125; 133; **96**, XXXIII; **98-9**, 4.
Leucanthemum vulgare, **83**, 191; **84**, 164.
Limax campestris, **92**, XXXVI; **96**, 53, 56.
Limneria oxylus, **98-9**, 12.
Limonius auripilis, **92**, 191.
Limothrips tritici, **94**, XXXIII.
Lina lapponica, **93**, 119.
Linaria Cymbalaria, **85**, 209.

Linaria Linaria, **97**, 340.
vulgaris, **84**, 167.
Linum usitatissimum, **97**, 307.
Listronotus appendiculatus, **94**, XXXV.
latiusculus, **94**, XXXV.
Lithophane antennata, **88**, 147.
Lithospermum arvense, **83**, 191; **84**, 159; 166; **97**, 327.
canescens, **97**, 327.
Lixus concavus, **89**, 153; 170; **90**, 232.
Lobelia inflata, **97**, 346.
syphilitica, **97**, 347.
Lolium Italicum, **84**, 178; **85**, 221.
perenne, **84**, 177; **85**, 212; **221**; **97**, 270.
Loxotænia musculana, **92**, 187.
Ludwigia alternifolia, **97**, 312.
palustris, **97**, 312.
Lychnis Githago, **83**, 190; **85**, 186.
Lycopus sp., **97**, 330.
Lyctus striatus, **96**, 47.
Lygus pratensis, **92**, 213.
Lysimachia Nummularia, **97**, 318.
Lysiphlebus raphæ, **93**, 111.
salicaphus, **94**, XXXIX.
tritici, **93**, 117.

Macrodactylus subspinosus, **82**, 81, **88**, 131; 150; **92**, 193.
Macrosiphum rubicola, **92**, 209.
Macrosporium Brassicæ, **00-01**, 21.
commune, **98**, 233.
Porri, **00-01**, 41.
Saponariæ, **97**, 286.
Sarcinula parasiticum, **00-01**, 41.
Malva rotundifolia, **83**, 193; **97**, 310.
sylvestris, **97**, 311.
Marrubium vulgare, **97**, 331.
Marsonia ochroleuca, **00-01**, 26.
perforans, **96**, 225; **99-00**, 139; **00-01**, 37.
Maruta cotula, **85**, 196.
Maurandia Barclayana, **85**, 209.
Medicago lupulina, **97**, 305.
Megilla maculata, **93**, 111; **98 9**, 9.
Meibomia canescens, **97** 306.
Dillenii, **97**, 306.
Melampsora populina, **92**, 137.
Melanconieæ, **00-01**, 2.
Melanconium fuligineum, **00-01**, 34; 87.
Melanoplus bivittatus, **96**, XXXIII.
femur-rubrum, **92**, 122; 123.
spretus, **92**, 205.
Melanotus communis, **92**, XXXVII; 229.
Melanoxanthus salicti, **88**, 158; **90**, LXII.
Melilotus alba, **92**, 85; **96**, XXXIX 89; **97**, 305.
officinalis, **97**, 305.
Melittia ceto, **96**, 38.
Melolontha subspinosa, **82**, 81.

Mentha piperita, **97**, 330.
spicata, **97**, 330.
Meromyza americana, **86**, 223; **92**, 74; **93**, 135.
Mesocheirus scitulus, **98-9**, 12.
Metalaspis pomorum, **84**, 156.
Microgaster glomeratus, **86**, 216; **217**.
militaris, **98-9**, 12.
xylinoides, **94**, XXXIX.
Microsphaera elevata, **00-01**, 25.
Mollugo verticillata, **84**, 169; **97**, 284.
Monilia fructigena, **89**, 140; 188; **97**, 113; **98**, 218; **99-00**, 120; **00-01**, 25; **45**; **49**.
Morthiera mespili, **89**, 187.
Mucor Mucedo, **00-01**, 6.
Muhlenbergia diffusa, **97**, 267.
Mexicana, **97**, 267.
Murgantia histrionica, **93**, 123; **96**, 35; **XXXIV**.
Mycelium, **00-01**, 3.
Myrsiphyllum asparagoides, **85**, 209.
Mysia 15-punctata, **92**, 189.
Mytilaspis pomorum, **84**, 156, **90**, LVIII; **97**, **209**.
Myzocallis sp., **96**, XXXV.
Myzus cerasi, **92**, XXXVII.
mahaleb, **92**, XXXVI.
ribis, **88**, 157.

Napæa dioica, **97**, 311.
Nectria Ipomoeae, **00-01**, 56.
Nematus ventricosus, **82**, 84; **83**, 196; 200; **85**, 187; **86**, 210; 211; **89**, **153**.
Nepeta Cataria, **97**, 330.
Nephelodes violans, **86**, 219.
Nepticula rubifoliella, **92**, 186.
villosella, **92**, 186.
Nicandra physaloides, **97**, **334**.
Noctua fennica, **92**, 175.
Novius cardinalis, **98-9**, 199.

Oberea bimaculata, **88**, 154; **92**, 199; **98-9**, 20; **26**.
Odontota dorsalis, **96**, XXXV.
Œdemasia concinna, **92**, 167.
Œcanthus niveus, **82**, 83; **86**, 212, 213; **88**, 154; **92**, 206.
Œnothera biennis, **84**, 168; **99-00**, **197**.
Oketicus, **93**, 103.
Onagra biennis, **97**, 314.
Onoclea sensibilis, **97**, 261.
Onopordon Acanthium, **97**, **363**.
Oospora scabies, **00-01**, 171.
Ophion macrurum, **92**, 172.
purgatum, **98-9**, 12.
sp., **98-9**, 15.
Orchelimum, glaberimum, **92**, **205**.
Orobanche ramosa, **97**, 342.
Oscinis coxendix, **92**, XXXVII.
umbrosa, **92**, XXXVII.
variabilis, **92**, XXXVII; **81**.
(?) **92**, **79**.

Osmunda cinnamomea, **97**, 261.
Claytoniana, **97**, 261.
Otiorhynchus ovatus, **93**, 121.
Oxalis stricta, **97**, 307.
Oxyopes scalaris, **98-9**, 8
Oxyptilus tenuidactylus, **92**, 180.

Pachybrachys carbonarius, **92**, 202.
Pachynematus extensicornis, **98-9** 14; **26.**
Pachyneuron aphidivora, **94**, XXXIX.
micans, **93**, 117.
Pachyrrhina (?) **92**, 243.
Paleacrita vernata see Anisopteryx.
Panicum capillare **97**, 264; 369.
Crus-galli, **97**, 264, 369.
proliferum, **97**, 264.
sanguinale, **83**, 190; **97**, 369.
Papaver dubium, **97**, 290; 369.
Papilio asterias, **88**, 162.
Paragus tibialis, **92**, XXXVI.
Paria aterrima, **86**, 200.
Paria 4-notata, **92**, 202
Parsonsia petiolata, **97**, 312.
Passiflora coerulea, **85**, 209.
Pastinaca sativa, **85**, 194; 197; **97**, 315.
Pelidnota punctata, **88**, 169.
Phemphigus, **93**, 110
rubi, **92**, 209.
Pentilia misella, **97**, 203.
Pentstemon digitalis, **97**, 341.
Perilitus Americanus, **98-9**, 9.
Peronspora effusa, **97**, 279; 280; **00-01**, 54.
parasitica, **97**, 294; **98-9**, 220; **00 01**, 21.
Schactii, **00 01**, 173.
Schleideniana, **00-01**, 41.
Pezomachus minimus, **98-9**, 12.
Phacelia Purshii, **97**, 326.
Phleum pratense, **84**, 174; **85**, 212: 219.
Phoma Betae, **00 01**, 170.
Persicæ, **98**, 232.
Phorbia fusciceps, **94**. XXXIV.
Phorocera leucaniæ, **98 9**, 12.
Phorodon mahaleb, **96**, 53.
Phoxopteris sp. (?), **92**, 185.
Phragmidium Fragariæ, **92**, 137.
mucronatum, **92**, 137.
speciosum, **00-01**, 53.
subcorticum, **00-01**, 53.
Phrygania, **93**, 103.
Phyllachora pomigena **00 01**, 12.
Phyllosticta acericola, **00-01**, 38.
Apii, **00 01**, 23.
Catalpæ, **00 01**, 25.
Cucurbitacearum, **98-9**, 222; **00 01**, 30.
sphaeropsoidea, **00-01**, 37.
Violae, **00-01**, 58.

Phyllotreta vittata, **91**, 50.
Physalis sp., **97**, 334.
Phytolacca decandra, **97**, 283.
Phytonomus punctatus, **92** XXVIII; **93**, 120; **94** XXXVI; **96** 27.
Phytophthora infestans **89**, 157; **00 01**, 51.
Phaseoli, **00 01**, 18.
Pieris rapæ **82**, 82; **83**, 197; 20.; **85**, 189, **86**, 215; **89**, LIII; **90**, LX; **91**, 47; **93** 120; **96**, 31.
Pimpla conquisitor, **93**, 107.
inquisitor, **93**, 107.
Piricularia grisea, **00 01**, 38.
Plantago arenaria, **97**, 251; 343; 344.
aristata, **84**, 169; **85**, 197; **95**, XLI; **97**, 342.
lanceolata, **95**, XL; **97**, 344.
major, **83**, 191; **84**, 160; 169; **85**, 197; **97**, 345
Rugelii, **97**, 345.
Plasmodiophora Brassicae, **97**, 297; 300; **00 01**, 20; 40; 58; 176.
Plasmopara-Australis, **98-9**, 220.
Cubensis, **96**, 234; **98**, 103; **98 9**, 219; 220; **99-00** 139; 140; 141; 142 **00-01**, 29.
Halstedii, **97**, 347.
sp., **98 9** 230.
viticola, **00-01**, 35; 87.
Platysamia Cecropia, **86**, 206.
Plowrightia morbosa, **97**, 118; **00-1**, 25.
Plusia brassicae, **86**, 196; 214; 216; **88**, 160; 162; **91**, 49.
Poa alsodes, **85**, 220.
arachnifera, **85**, 222
compressa, **97**, 269.
nemoralis, **84** 176.
pratensis, **84**, 175; **85**, 212; 220.
serotina, **84**, 176; **85**, 220.
trivialis, **84**, 176; **85**, 212; 220.
Podosphæra Oxyacanthæ, **97**, 124.
Poecilocapsus 4-vittatus, **86**, 211.
Polanisia graveolens, **97**, 301.
Polygonum arifolium, **97**, 279.
aviculare, **97**, 277.
Convolvulus, **97**, 278; 369.
erectum, **97**, 277.
hydropiper, **83**, 190.
Pennsylvanicum, **97**, 278; 369.
Persicaria, **97**, 278; 369.
sagittatum, **97**, 279.
Pomphopæa ænea, **94**, XXXIV.
Portulaca oleracea, **83**, 192; **84**, 159; **97**, 284.
Potamogeton natans, **97**, 262.
Potentilla Canadensis, **97**, 302.
Monspeliensis, **97**, 302.
recta, **97**, 303.
Praon coloradensis, **94**, XXXIX.
Prionus laticollis, **92**, 198.
Prodenia lineatella, **92**, 187.
Prunella vulgaris, **97**, 331.
Pseudalius ovis, **98**, 167; 168.

Pseudomonas campestris, **00-01, 20.**
Psyche confederata, **93**, 102.
plumifera, **93**, 103.
Psylla tripunctata, **92**, 209.
Pteris aquilina, **97**, 261.
Pteromalus sp., **93**, 107.
puparum, **86**, 216; **217.**
Puccineae, list of, **92**, 134; 139.
Puccinia Asparagi, **97**, 273, **00-01, 16.**
bullata, **00-01**, 24.
Castagnei, **00-01**, 24.
coronata, **00-01**, 41.
graminis, **00-01**, 54.
or simplex, **00-01**, 17.
P. rubigo-vera, etc., **00-01, 17.**
Kuhniæ, **97**, 348.
Malvacearum, **00-01, 36.**
Maydis, **00-01**, 27.
Polygonorum **97, 278.**
Pruni-spinosæ, **98, 231.**
sp., 98-9, 39.
suaveolens, **97**, 361.
Pulvinaria innumerabilis, 84, 156, **90, LIII.**
Pyrethrum cinerariæfolium, **86**, 195; **196.**
Pyrophila pyramidoides, **92**, 177.
Pyrrharctia isabella, **92**, 122; **162.**

Ramularia Barbareæ, 97, 299.
rufo-maculans, **00-01, 20.**
Ranunculus abortivus, 97, 288.
acris, **97**, 288; 289.
sceleratus, **97, 288.**
sp., **97**, 288.
Raphanus Raphanistrum, 97, 299.
Reana luxurians, 82, 95.
Rhaphitelus maculatus, 94, XXXIX; 96, 26.
Rhizoctonia, 00-01, 22.
Rhizopus nigricans, 00-01, 56.
Rhodites radicum, 92, 156.
spinosa, **94**, XXXIX.
Rhogas terminalis, 98-9, 12.
Rhus coriaria, 97, 310.
glabra, **97**, 310.
radicans, **97**, 310.
vernix, **97**, 310.
Rhynchites bicolor, 92, 204.
Rhytisma acerinum, 00-01, 38.
Rœstelia pyrata, 92, 137.
Roripa Armoracia, 97, 299.
palustris, **97, 299.**
Rosa humilis, 97, 303.
Rubus Canadensis, 97, 302.
villosus, **97, 302.**
Rudbeckia hirta, 84, 168; **97, 353.**

Rumex Acetosella, 83, 190; **97, 275.**
crispus, 83, 192; 97, 275.
obtusifolius, 97, 275.

Sabbatia angularis, 97, 318.
Sagittaria latifolia, **97, 262.**
Salix sp., **97**, 274.
Salsola Kali-Tragus, **97**, 280.
Sambucus Canadensis, **97, 345.**
Samia cynthia, **93**, 108.
Saperda bivittata, **82**, 86.
candida, **86**, 209; **96, XXXV.**
Saponaria officinalis, **97**, 286.
Sassafras Sassafras, **97**, 290.
Sclerostomum equinum, **86**, 298; **89, 21; 35.**
Schistocerca americana, **98**, 52.
paranensis, **98**, 52.
peregrinum, **98, 52.**
Schizoneura lanigera, **98-9**, 254.
Schizura ipomeæ, **92**, 168.
unicornis, 92, 168.
Scolytus rugulosus, 94, XXXIX; **96, 23.**
Scopelosoma sidus, **92**, 177.
Scrophularia Marylandica, **97, 341.**
Sedum acre, **97**, 302.
Telephium, **97**, 301.
Segnipiesis, nigrifemora, **94, XXXIX.**
Selandria cerasi, **86**, 204.
rubi, **88**, 155; 156; **92, 154.**
Semiotellus chalcidiphagus, **93, 134.**
Senecio scandens, **85**, 209.
Senotainia trilineata, **98-9**, 12.
Sepha rubifolii, **92**, 209.
Septoria Chrysanthemi, **00-01**, 26.
consimilis, **92**, XXXIX; **145.**
Dianthi, **96**, 232; **00-01**, 22.
Erechthites, **97**, 359.
Lycopersici, **96**, 241; **98**, 118; **98-9**, 232; 233; **99-00**, 140; **142; 00-01**, 57.
petroselina Apii, **96**, XXXVIII; **00-01**, 23.
piricola, **00-01**, 48.
Pisi, **00-01**, 42.
polygonorum, **97**, 278.
ribis, **97**, 99; 100; **00-01**, 31; **33.**
Rubi, **91**, 126; **97**, 108; **00-01, 19; 32; 53.**
Westerndorpii, **97**, 279.
Sericaria mori, **92**, 187.
Sesia hemizonæ, **92**, 187.
Setaria glauca, **83**, 189; **85, 197.**
viridis, **85**, 197.
Sida spinosa, **97**, 311.
Silene antirrhina, **97**, 285.
conica, **97**, 251; 285.
noctiflora, **97**, 285.
Silpha lapponica, **93, 119.**

Sinapis alba, **85**, 195.
nigra, **85**, 195; 197.
Siphonophora avenæ, **88**, 131; **89**, XLVII; 150; 170; **90**, LVII; 92, XXXVI; **93**, 113, 116.
cucurbitæ, **92**, XXXVII; **96**, 38.
rubi, **92**, 209.
Sirex pygmæus, **92**, 70.
Sisymbrium officinale, **85**, 197; **97**, 297.
Sitones flavescens, 94, XXXVI.
Smilax rotundifolia, 97 273.
Solanum Carolinense, 84, 169; **95**, XL; **97**, 334.
Dulcamara, **97**, 337.
nigrum, **97**, 337.
rostratum, **95**, XL; **97**, 337.
Solenopsis fugax, **92**, 157.
Solidago Canadensis, **97**, 349.
nemoralis, **97**, 349.
Sonchus arvensis, **97**, 367.
asper, **97**, 267.
oleraceus, **97**, 367.
Sorghum halepense, **85**, 221.
vulgare, **85**, 221.
Sparganium eurycarpum, **97**, 262.
Sphaceloma ampelinum, **00 01**, 34; 87.
Sphaerella Fragariæ, **00-01**, 55.
Sphæropsis malorum, **97**, 127; **00 01**, 14; **51**.
Sphærotheca Castagnei, **97**, 347; 359.
mors-uvæ, **97**, 101; **00-01**, **33**.
Oxyacanthæ, **00-01**, 25.
pannosa, **98**, 225.
Sphecius speciosus, **98**, 63.
Sphenophorus parvulus, **92**, 72.
sculptilis, **92**, 72.
Sphinx ephemeræformis, **93**, 103.
Spilochalcis muriæ, **93**, 107.
torvina, **94**, XXXIX.
Sporodesmium putrefaciens; **00-01**, 170.
Sporotrichum globuliferum, **93**, 143; **97**, 35; 39; **40**.
Stachys palustris, **97**, 332.
Stagmomantis carolina, **93**, 123.
Stellaria media, **83**, 193.
Stibeutes pettitii, **98-9**, 12.
Stictonotus issosomatis, **92**, 68.
Strachia histrionica, **96**, 36.
Strongylus contortus, **86**, 293; 294; **98**, 165; 172; **99-00**, 200.
filaria, **86**, 293; **98**, 167; **99-00**, 200.
rufescens, **98**, 167; 168.
Synchlora glaucaria, **92**, 178.
Systena altica, **93**, 96.
blanda, **93**, 96.
elongata, **93**, 98.
frontalis, **93**, 98.
ligata, **93**, 96.
marginata, **93**, 98.
mitis, **93**, 96.
tæniata, **93**, 96; **97**, 279; 283; **98-9**, **122**.

Tabanus abdominalis, **92**, XXXVIII.
Tachina sp., **93**, 107; **98-9**, 15.
Tanacetum vulgare, **97**, 359
Taraxacum Densleonis, **84**, 159.
Taraxacum **97**, 365.
Tecoma radicans, **97**, 342.
Tenthridio, **93**, 103.
Termes flavipes, **96**, XXXV; 42.
Tetranychus telarius, **98 9**, 254.
Teucrium Canadensis, **97**, 334.
Thalaspi arvense, **95**, XL; **97**, 294.
Thalictrum purpurascens, **97**, 290.
Thaspium sp., **97**, 316.
Thielavia basicola, **96**, 228.
Thrips tritici, **92**, 207.
tritici tabaci, **95**, XXXIII.
Thyatira scripta, **92**, 187.
Thyridopteryx, **93**, 103.
ephemeræformis, **93**, 102; 123; **94**, XXXII; **96**, XXXIV.
Tilletia fœtens, **99 00**, 141; **00 01**, 60.
sp., **98-9**, 55; 38.
striæformis **00 01**, 19.
Tipula bicornis, **92**, 239; 247.
costalis, **92**, 245.
hebes, **92**, 238.
Tischeria malifoliella, **94**, XXXIX.
Tmetocera ocellana, **92**, 182.
Toxoptera graminum, **93**, 113.
Tragopogon porrifolius **97**, 368.
Trichobaris trinotata, **94**, XXXVI.
Trichogramma acuminatum, **95**, 95.
flavum, **93**, 125.
Trichoptera, **93**, 103.
Trichostema, dichotomum, **97**, 332.
Trifolium agrarium, **97**, 306.
arvense, **97**, 306.
pratense, **85**, 212.
repens, **85**, 212.
Trioxys piceus **93**, III.
Triticum repens, **83**, 190.
vulgare, **86**, 54.
Trombidium locustorum, **96**, XXXIV.
Trypeta pomonella, **90**, LXIV.
Tyloderma foveolatum, **99 00**, 197.
fragariæ, **83**, 201; **86** 202.
Tymnes tricolor, **92**, 102.
Typha latifolia, **97**, 267
Typlocyba albopicta, **89** 154.
rosæ, **89** LIII, 155.
Tyroglyphus phylloxeræ, **94**, XXX; **95**, **84**.

Uncinula macrospora **00 01**, 33.
necator, **00 01**, 35; 87.
Uniola panicula, **98 9**, 238.
Uredineæ, **00 01**, 2.

Urocystis Cepulæ, 96, XXXVIII; 00-01, 42; 72; 83; 170.
occulta, 00-01, 54.
Uromyces, 92, 133; 139.
appendiculatus, 00 01, 18.
Betæ, 00-01, 173.
caryophyllinus, 00-01, 22.
Trifolii, 00-01, 26.
Urtica dioica, 97, 275.
gracilis, 97, 274
Ustilagineæ, 00 01, 2.
Ustilago Avenæ, 00 01, 41.
lævis, 00-01, 41.
Crameri, 00 01, 38.
Hordei 00-01, 17.
nuda, 00 01, 17.
panici-glauci, 97, 265.
perennans, 00 01, 41.
Reiliana, 00 01, 19; 54.
sp., 98 9, 33.
Tritici, 99 00, 141; 00-01, 59.
utriculosa, 97, 277; 278.
Zeæ, 00-01, 28.

Valerianella radiata, 97, 346.
Valgus canaliculatus, 96, XXXV.
Vanessa antiopa, 86, 228.
Veratrum album, 84, 153; 86, 195.
Verbascum Blattaria, 95, XL; 97, 339; 340.
Thapsus, 83, 192; 97, 338.
Verbena angustifolia, 97, 329.
bracteosa, 97, 329.
hastata, 97, 329.
urticæfolia, 97, 329.
Verbesina alternifolia 97, 355.
Vernonia gigantea, 97, 347.
Noveboracensis, 83, 192.
Veronica agrestis, 97, 341.
arvensis, 97, 341.
officinalis, 97, 341.
peregrina, 97, 341.
serpyllifolia, 97, 331.
Vicia Cracca, 97, 307.
sativa, 96 89; 97, 306.
villosa, 96, 88.
Vinca minor, 97, 319.

Websterellus tritici, 93, 134.
Winthemia quadripustulata, 98 9, 8; 12.

Xanthium Canadense, 97, 353.
spinosum, 97, 353.
strumarium, 83, 189.

Yucca filamentosa, 97, 273.

Zea mays, 86, 83 96, 96.
Zeuzera Pyrina, 97, 48